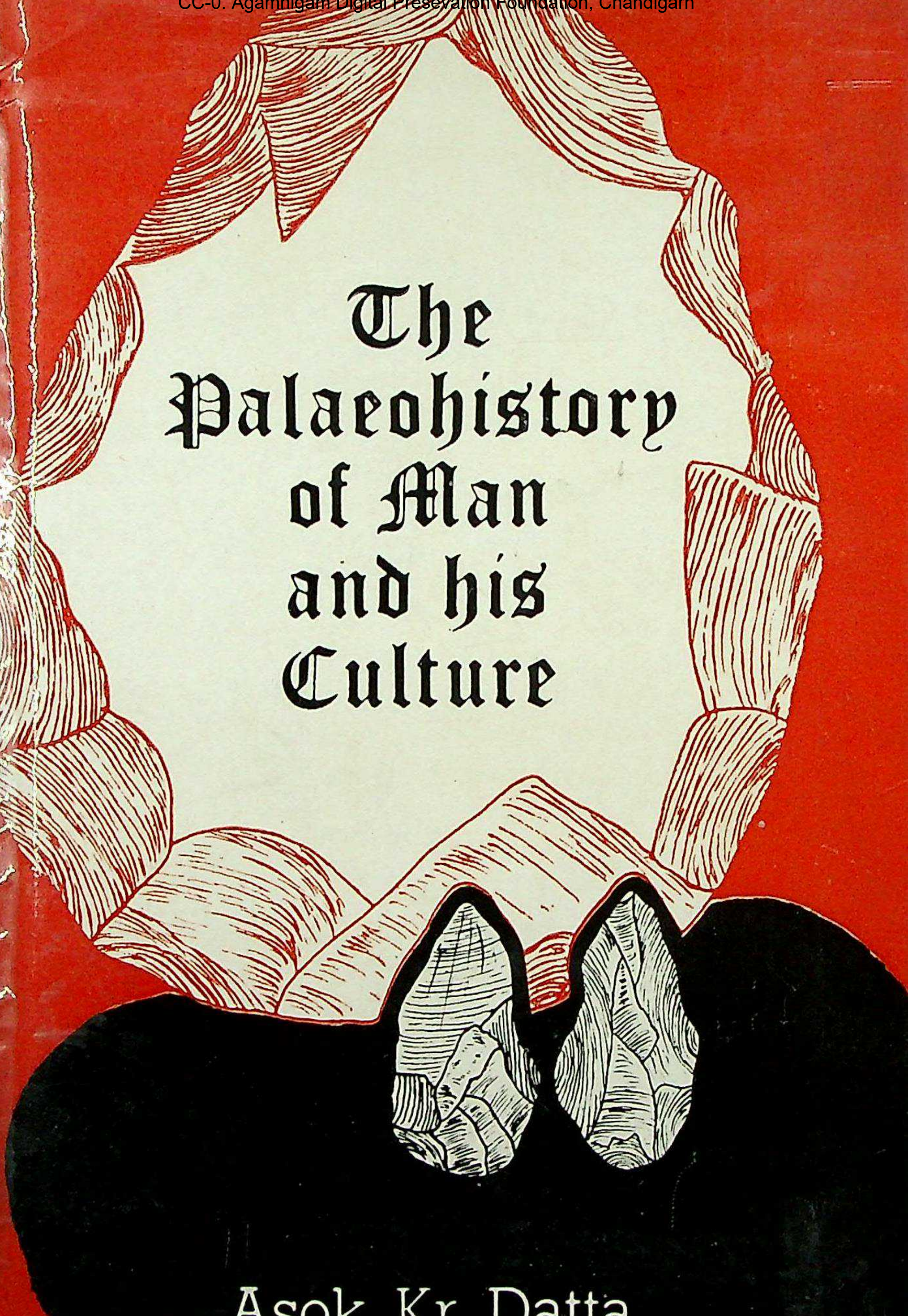

The Palaeohistory of Man and his Culture

Asok Kr. Datta

THE PALAEOHISTORY OF MAN
AND
HIS CULTURE

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Dr. ASOK KUMAR DATTA

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Dedicated to
the memory of my father
K.K. DATTA

CONTENTS

Preface 9

List of Figures 13

Part I

CHAPTER–I

An introduction to the background of human evolution 17

CHAPTER–II

Problem of Nomenclature 32

CHAPTER–III

A brief Survey of Indian Palaeolithic studies 37

Part II

Lower Palaeolithic

CHAPTER–IV

Geological and Geo-morphological features 49

CHAPTER–V

Distribution of Sites and Emergent Zones 65

CHAPTER–VI

Geo-stratigraphy related to Palaeolithic studies 77

CHAPTER–VII

Raw material, techniques and types 88

CHAPTER–VIII

Assemblages, industries and cultures zones 98

CHAPTER–IX

Dimension of Space and Time 107

CHAPTER–X
Palaeo-ecology and cultural interactions 114

CHAPTER–XI
Summary and Conclusion 122

Part III

CHAPTER–XII
Middle Palaeolithic 127

1 Introduction
2 Distridution of sites
3 Tool-types
4 Techniques
5 Summary and Conclusion

Part IV

CHAPTER–XIII
Upper Palaeolithic 139

1 Introduction
2 Distribution of Sites
3 Tool-types
4 Techniques
5 Summary and Conclusion

Bibliography 148

Index 161

PREFACE

The history of Prehistoric research in the Indian sub-continent was accelerated by Robert Bruce Foote with the discovery of Palaeoliths from Pallavaram near Madras in the year 1863 and since then innumerable sites along with a huge number of stone tools have been discovered over a wide area covering the map of whole India except Assam and Kerala where Palaeo-environment was not perhaps favourable for the growth of prehistoric habitation.

During this century, a number of Indian and Foreign scholars have worked on prehistoric cultures. But what is the net result? Barring a few exceptions, no serious attempt was made to understand the prehistoric culture with its problems related to Palaeo-culture of this sub-continent.

Some amount of valuable works were done in North-West India by Yale-Cambridge expedition led by De-Terra and Paterson, in Western India by Paterson and Drummond, in South India by K.D. Banerjee, Eastern India however remains the most unattended area. The only excavation at Mayurbhanj in this region, carried out by D. Sen and N.K. Bose, has yielded some good result. About Singhbhum, A. Ghosh has made some valuable contribution on stone age culture.

In West Bengal, the acceleration of prehistoric research was made by Ball with the discovery of Palaeoliths from Bankura in the year 1883. But unfortunately, after that momentum discovery of Ball, there was a complete vaccum for about a century. It was only from 1960 onwards the prehistoric research got it's recognition through the works of scholars like

V.D. Krishnaswami, D. Sen, N.K. Bose and A. Ghosh. The total result of these works are the enlargement of prehistoric map of West Bengal. But as yet no serious attempts were made to break through the conventional idea of collection of stone tools and location of sites. As a matter of fact many questions remain unanswered even today. For example we do not know why Choppers, Handaxes, and Cleavers are not found proportionately from a particular place? why the range of variation is so wide? Is it due to ecology of a particular place? or different group of people are responsible for Choppers and biface traditions? We do not know whether the lower palaeolithic tools recovered from this part of the country, either from gravels (Bed I) or laterite, geologically belong to the same period of other sites found elsewhere in India we do not also know precisely where the lower palaeolithic ends and succeeds by middle palaeolithic? The Question whether the Neandarthal people, who are responsible for middle palaeolithic (Mousterian) culture of Europe and other parts of the world, are also the makers of middle palaeolithic industry of West Bengal, remain still unanswered. There are many such queries which are yet to be solved.

In the absence of any absolute dating it is very difficult to get any precise answer. The only alternative left to us is to rely on geo-stratigraphy and typology. In West Bengal, the *in situ* materials, specially of middle and upper palaeolithic period, are very rare. In that case typology along with technology can help in an indirect way, and that too is of immense help.

The present work is an attempt in this direction. An attempt has been made here to find out the uneven distribution of Choppers, Handaxes and Cleavers, and the resultant picture of this statistical compilation of datas from different sources, helps the emergence of three cultural zones, each having a maximum coverage of a particular type. While considering the materials, due attention was given to palaeo-ecology, geo-stratigraphy, technology and such other forms related to the palaeolithic cultures of West Bengal.

The method applied in lower palaeolithic industries, could not be used in case of the middle and upper palaeolithic industries of West Bengal due to scarcity of the substantial materials. This limitation has prevented the author from bringing out a comprehensive picture of middle and upper palaeolithic industries of West Bengal.

I am obliged to a number of persons for their help, guidance, assistance and co-operations. I am very much obliged to Dr. Niharranjan Roy for rendering immense help. I acknowledge my gratitude to Dr. Amita Ray for initiating in me the original idea of writing a book on prehistory of West Bengal. I am also obliged to Dr. A.K. Ghosh (my teacher) who on many occasions, gave valuable suggestions and thoughtful discussions. My obligations are also due to Mr. P.C. Dasgupta, former Director, Directorate of State Archaeology, West Beneal, for going through the manuscript and made valuable suggestions. He also supplied me all the informations relating to the explorations undertaken by his Directorate. Apart from this, I am also obliged to a number of persons including Dr. Ajit Danda, Dr. (Mrs.) Ranjana Roy, Dr. (Mrs.) C. Gupta, Dr. (Mrs.) P. De, Mr. N.C. Ghosh (Superintending Archaeologist, Archaeological Survey of India, Eastern Circle, Calcutta), Dr. S.C. Mukherjee, Late D.K. Chakraborty, Mr. Sudhin De, Dr. P.G. Chatterjee, Dr. A. Sen, Dr. G.D. Mitra, Dr. P.N. Hansda, M. Rathin Ghosh, Arun Ghatak, Tapas Banerjee, Gopinath Ghosh, Shymal Banerjee, Nitai Chandra De, P. Ghosh, Ranen Mukherjee, B. Chatterjee, Alok Sen, S. Ghora, Hirak Banerjee, Anil Banerjee, Batakrishna Mallick, Swapan Bose, Sisir Guhathakurta and many other well wishers. E.D. Samson prepared the drawings and charts.

My last not the least obligation is to my wife Rita who always inspired and helped me.

Dr. Asok Kumar Datta
Department of Archaeology,
University of Calcutta,
52/1 Hazra Road,
Calcutta-700019.

LIST OF FIGURES

1. Evolution of Man
2. Map of West Bengal Showing the Principal Geomorphic Sub-Division
3. Map of West Bengal
4. Table showing the Correlation of Deposition of Different Rivers of West Bengal alonge with lithic Industries
5. Evolution of Tools
6. Palaeolithic Tools from Susunia
    - a. Handaxe on Pebble
    - b. Scraper cum Border
    - c & d. Handaxes on Flake
7. Map showing the Percentile distribution of major types from six localities
8. West Bengal Scale
9. West Bengal Scale
10. Hominid Cultural Interactions
11. West Bengal Scale
12. Area Yielding Middle Palaeolithic Materials
13. Middle Palaeolithic Tools West Bengal
    - a & b. Side Scraper
    - c & d. Points
14. Middle Palaeolithic Tools
    - a, b, c & d. Small Handaxes
15. Area Yielding Upper Palaeolithic Materials
16. Upper Palaeolithic Tools

PART I

CHAPTER I

An Introduction to the Background of Human Evolution

The History of mankind is perhaps the most facinating and tempting one. To trace the history of lineage of mankind one has to go some million years back. The main aim of the Palaeolithic Studies is to re-construct culture in the broader sense (Ghosh 1973). Culture during this dim period played a very important role in the Hominisation process (Howell 1965). The cultural development as well as the process of evolution of man are interrelated as man is a product of interaction of both biological and cultural developments (Dobzhansky 1963). The study of the evolution of man is a complex matter and it depends on numerous factors including geological and climatic changes. If such changes are marked, a corresponding tendency towards a greater evolutionary change will also be observed since a new set of living conditions may demand difference in animals to secure survival (Arthur Beiser 1964). The history of evolution of man are synonymous and such one episode could influence the other.

Culture of any period is determined by the traits contained in the Culture. The traits may be material, ideological, religious, or such other form. In case of Cultures of Prehistoric times the above connotation does not change, but the availability of traits complexes gradually decreases with time (Datta, 1977). In other words, the neolithic period supplies a number of information both abstract and material while in case of mesolithic time period the abstract cultural traits are indeed difficult to identify because of their relatively scanty presences the Chances of their survival being remote. This is more deeply felt with regard to Palaeolithic epochs.

The main way of reconstructing the culture of this vast remote period is the material trait that is predominantly represented by artefacts. The recent studies point out the significance of biological implication for understanding culture, specially of Palaeolithic period (Freeman 1971).

The study of Prehistoric research depends on the availability of the relevant materials both Palaeontological as well as cultural. Geographically as one may conjecture India may have distinctive importance in respect of the emergence of man. Besides this, the importance of India is revealed by climatic, geological, floral and faunal aspects and above all by palaeontological remains and cultural data De Chardin (1953), Von-Koenigswald (1966), Bordes (1968), Ghosh (1971, 1973a, 1974a), Pilbeam (1972), Simons (1974). The possibility of a hominid fossil find in India has been suggested by a number of scholars including De Chardin (1953), Zeuner (1951), Bordes (1968) and Simon (1960). But unfortunately, no significant *hominid* fossils except a solitary jaw of a young *Homosapien-sapien* from Sijva have so far been found from this vast sub-continent. This poses a severe difficulty in the study of Prehistory in India. In fact, the entire range of Indian Pleistocene is devoid of any *hominid* fossil, a situation which makes it hard to asses India's role in the problem of human evolution and reduces the Palaeolithic Studies in India by and large to the level of contextual and typological analysis of artifacts alone (Ghosh & Chakravorty 1973).

Inspite of the lack or paucity of hominid fossils India is rich in primate fossils and on the basis of which it may be assumed that these regions during *Tertiary* Period was a favourable ground for the process of human evolution. These primate fossils found from the deposits of the Siwalik hills in the North west of the Indian sub-continent have statlingly thrown a new light on the perspective of the evolution of man. Fossil remains of three genera of the sub-family *Dryopithecea* i.e., *Dryopithecus, Gigantapithecus* and *Ramapithecus* (Simons and Pilbeam 1975) have been found from India and all of them are located in Siwalik regions.

The earliest find of the *Dryopithecus* a maxilla, came from a plàce Near Jabbi, Pakistan. The geological horizon of this find has tentatively been suggested by Pilgrim (1915) as belonging to Dhok Pathan Stage of Miocene-Pliocene deposits. The find was described by Lydekker (1879) as *Palaeo-Pithecus Sivalensis* which creates a good deal of confusion about the nomenclature of *Dryopithecus*. Simons and Pilbeam (1965) revised this sub-family Dryopithecinae. They suggested that the Asiatic Dryopithecus has only one sub-genus *Sivapithecus* in which the species are *Dryopithecus Indicus* and *Dryopithecus Sivalansis*. The date of *Dryopithecus* specimen has been assigned to 18 million years B.P. The find of *Dryopithecus* specifies confined to only jaws and teeth. But it was widely distributed. The remains have been unearthed throughout Europe, North India, and China. It is beyond doubt that *Dryopithecus* later gave rise to *Ramapithecus* and possibly *Gigantopithecus* too (Ghosh 1975).

The combined expeditions of Yale-Chandigarh University in 1968 has led to the discovery of a mandible of a new species of Gigantopithecus. The specimen has been named as *Gigantopithecus bilaspurensis* (Simons and Chopra, 1969 a, '69 b). The find has been recovered from Haritalyanga and has been estimated to be about 6 to 9 million years old. The species serves to establish that the genus Gigantopithecus was derived from a species of *Dryopithecus* and not from a species *Oreopithecus* or from an unknown side branch of Hominoidea (Simon 1975).

Gigantopithecus specimen has also been found from China (Von Koenigswald 1935, 1952), (Woo 1962). The specimen is known as *Gigantopithecus Blacki* and estimated to be about 5 to 1 million years B.P. It is assumed that the Indian find *Gigantopithecus Bilaspurensis* later gave rise to the Chinese variety *Gigantopithecus Blacki*, as the species' differentiation through time and space is not very improbable (Ghosh 1975).

The specimen of Ramapithecus find came from Chinji village near Chinji Zone in Pakistan. Later on more finds came from Haritalyangar regions. The recent discovery of a Ramapithecus mandible from Nepal is highly significant in terms of human evolution. The specimen has been tentatively dated as 11 million years old. Like Dryopithecus, there was also a good deal of controversy about the naming of the species of Ramapithecus. The name for all the species was proposed by Simons (1972) as Ramapithecus Panjabikas. The find tentatively been dated as 14 million years old. It may be noted here in this connection that the upper jaw of Ramapithecus, found by Leakey from Africa has been dated as 14 million years old by Potassium-Argon method. From the dentition pattern it may be assumed that Ramapithecus was more close to man then pongid. (Simons 1961, 1964), (Simons and Pilbeam 1965), (Prasad 1969 b), (Von Koenigswald 1972-73). The position of the Ramapithecus in the context of human origin is highly significant (Ghosh 1975) as it stands closer to man than other physical structures of the related families. It is also assumed that in Nagri Zone where Ramapithecus frequented had a forest ecology with well-watered environment (Lewis 1937), (Tattersall 1969), (Pilbeam 1969), (Prasad 1971), (Simons 1972). The Ramapithecus find is highly significant in respect of the part that it played in the process of hominization. It has also been reported from China, Far East and Africa. Ramapithecus had close proximity with both man and ape. It was half man and half ape. The Siwalik region wherefrom the Ramapithecus finds have been reported might have served as a common corridor of east-west movement and possibly this area saw the breeding of true hominids in due course. The lack of later hominid fossil finds from this area has been explained by many experts in terms of spatial shift of both Ramapithecus and

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Gigantopithecus to South-east Asia and China respectively. The Ramapithecus was perhaps a kuckles walker (Washburn 1968), (Tuttle 1969), and had the capability of arm swinging and suspension (Oxnard 1969). There is no direct evidence to prove that Ramapithecus used and fabricated tools. But it is not unlikely that adhoc tools (Simons and Pilbeam 1965) might have been used to compensate the reduction of canine on the one hand and other external changes on the other. We do not have any direct evidences to show that Ramapithecus could have walked erect. If he could not walk erect, how should we expect that he could use adhoc tools. Robinson has perhaps rightly pointed out that bipedalism came before true tool use did. It may be assumed on the basis of Palaeontological and other relevant data that Ramapithecus were meat eaters. Charles Kimberlin said meat-eating and hunting were important factors. If you remain vegetarian, the necessity for culture was not nearly as great. Richard Leakey too believes that hunting help to make emerging man a social creature. The hominid that thrived best were those who were able to restrain their immediate impulses and manipulate the impulses of others into co-operative efforts. They were the vanguard of human races. Ramapithecus is the earliest man like Primate (Howell 1965) is so far regarded by experts to be the oldest of man's ancestors in a direct line. The simian is rightly structured to be an ancestor of the hominids. Still there are many things the meaning of which are not even known today. We do not know when, where and how the Pongid and hominid line became separated. Only we can make logical speculations on the basis of available palaeontological data that Ramapithecus played an important role in the process of human evolution. The fossil finds of Ramapithecus have been unearthed from Africa, China and India. So it may be assumed on the basis of the above fossil finds that either of these places might be the place of origin of man. The position of India is quite ambiguous due to the lack of later fossil finds of Australopithecus and Homo Erectus which makes it hardly possible to asses India's role in the process of human evolution. Any how the lack of fossil finds has to some extent been compensated by the enormous cultural data found all over India. The lack of

5337

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fossil finds may be explained in terms of survey of ossiferous regions in India that has been done very inadequately uptilnow. The dearth of proper scientific explorations amidst quaternary deposits in the sub-continent has, as it appears, denied us of the evidences required for reconstruction of the annals of early man in the country.

Sometime it has been suggested that the lack of later hominid fossil finds from India are mainly due to the spatial shift of both Ramapithecus and Gigantopithecus. According to a view already referred to Gigantopithecus was displaced to China while Ramapithecus made a shift to east and south east direction. It has been held that this left a vaccum of no man's land for about 5 million years and that the places where both Ramapithecus and Gigantopithecus had migrated might have become favourable for the emergence of man. After their initial emergence the *hominids* dispersed and one of the branches entered India during the Middle Pleistocene period (Ghosh 1975).

The history of evolution of man in India has been compensated to a considerable extent by the enormous culture remains in the form of stone tools which help us to work out a broad stratigraphy of the cultural development during different stages. Stone tools of different periods have been found from all over India except the places where habitation was not favourable or in areas that have been subjected to certain climatological or geological phenomena and other influences including human agencies. A careful technotypological study will reveal the informations relating to their makers or users. Such cultural development speaks of the biological evolution of man slightly in an indirect way. Before we are going to discuss the technotypological development during different periods, it is apt to have a brief review of the Palaeontological materials assignable to these periods in different parts of the world.

The immediate ancestor of hominid people is Australopithecus the fossil of which was found by Raymond Dart in

1924 at Taung in South Africa. The skull belonged to a baby of five years old and hence it was known as *Taung Baby*. Raymond Dart named this species as Australopithecus Africanus. In the event of human evolution, bipedalism, brain-development and tool using are interrelated, one effects the other, each depending on and stimulating the other. Still the question whether bi-pedalism or tool using came first remains unsolved. Prof. Washburn (1969) has suggested that tool-using preceded walking on two legs while many others believe that bipedalism came first. The later view proved correct from later finds of Australopithecus and Paranthropus at Olduvai where it was observed that the strata belonging to the Australopithecus contained stone tools. Further, it has been known that such strata more precisely belonged to Australopithecus not to Paranthropus. Both Paranthropus and Australopithecus walked erect. So the question of adhoc tool using practices by Ramapithecus does not hold good. Because we do not so far have any positive evidence to show that Ramapithecus who survived 14 millions years ago could have walked erect. Dart (1925) declared it stood intermediate between living Anthropoid and Man. It was dated as 2 million years old. Dart believes that Australopithecus could have used tools. In 1936, Robert Broom discovered fossil remains of an Australopithecus Africanus from Sterkfontein similar to those found at Taung. The discovery further supports the contention of Raymond Dart and measurement shows that it was short in height (3′-3″). The foramen magnum suggests that it could walked erect and was a true bipedal creature. In 1936 Broom found a somewhat different ape at a place called Kromdrai in South Africa. This time it was heavier, larger and had bigger teeth. He called it Australopithecus Robustus. It was dated as 2 million years old.

What was most interesting was that Australopithecus Africanus was a small creature (3′–3″), slender and weighing about 60–70 pounds and could use unfabricated tool. It was perhaps an omnivorous creature. Australopithecus finds have also been reported from eastern and central Africa, Palestine, China and Java. It played definitely a significant role in the process of human evolution. The fossil of this genus has not yet been reported from India. Whereas the Australopithecus Robustus was more than 5′ tall and weighed between 130–150 pounds, his skull and jaw were massive and was more primitive than Australopithecus Africanus. The size of it's molar and premolar and massive skull-ridges strongly suggest that it was a vegetarian creature.

The above characters strongly suggest that they were two different species. Finally they were put into two different genus of Australopithecus and Paranthropus. The question became more complicated with the discovery of a younger Paranthropus fossil, of 1/2 million years old from Lake Natron in Tanzania. How could he survive unchanged for about a million years. Robinson (1961) suggested that he (Paranthropus) did not change as he could not use tools. He practically remained static for about a million years and as a matter of fact he could not survive the selection mechanism and became extinct. In 1950 this was confirmed by the discovery of an Australopithecus fossil from the same strata (Bed I) at Olduvai by Leakey where Paranthropus fossils were found earlier. It was further suggested that the tools found from the layer were used by Australopithecus and not by Paranthropus. Hence the question of Australopithecus and Paranthropus was settled once for all.

The next important discovery in the line of evolution of man was made by Jonathan Leakey, son of Dr. L. B. S. Leakey on 2nd Nov. 1960 from Bed I at Olduvai. It was dated as 1.8 million years old and had more man-like traits than Australopithecus. It had a brain capacity measuring 700 C. C. while Australopithecus had a brain capacity of 450-500 C.C. The larger brain capacity placed it in between Australopithecus and Homoerectus. It was 1.2 to 1.25 metre tall and weighed 40-50 kgs. It lived in open steppe country and was found associated with stone tools. It could walk on two legs in an erect position not very different from modern man (Jelinek 1975). Louis Leakey and his colleagues named it as Homo habilis. In 1977, Richard Leakey, another son of Louis Leakey discovered fossil remains of Homo habilis from Turkana in East Africa.

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position of Homo habilis was definitely between Australopithecus and Homo erectus. But whether it derived from Australopithecus or from other form of species is a matter of great controversy. The discovery of Homo habilis has complicated the situation, Phillip Tobias (1966) has observed that "we can no longer talk of a great chain of being in the 19th Century sense, from which there is a missing link." He further pointed out that "we should think rather of multiple strands forming a network of evolving populations, diverging and converging, some strands disappearing, others giving rise to further evolutionary development." (*Time*, Nov. 1977, p. 47). (Fig. No. 1)

The next important discovery in the line of human evolution was that of *Homo erectus* which is placed under the genus Homo to which we all belong. Homo erectus people had an erect posture and could move freely. That they did not differ much from the modern man is evident from the position of their foramen Magnum. It had a flattened forehead and protruding mouth. The molars, incisors and canines are more or less similar to those of modern man. It had a brain capacity ranging between 750 C.C. to 1200 C.C.

The first discovery was made by Eugene Du Bois in 1890 in Java. Du Bois called it *Pithecanthropus Erectus* or (Erect ape man). But unfortunately, the momentous discovery of Du Bois was not recognised till 1924 when it was finally given the status of Pithecanthropus by scientists. Since then a number of discoveries were made in different parts of the world making the problem a bit clear.

In 1927 Davidson Black made a similar discovery of Homo erectus fossil amidst the limestone hills of Chou-kou-tien near Bezing. Prof. Black (1927) called it *Sinanthropus Pekinensis*. In China, major contributions were made, in respect of Palaeontological research, by Black, Weidenreich and Pai resulting in the discovery of more than thirty specimens of fossil men. But, unfortunately, after the post war, the fossils were found missing. The brain capacity of *Sinanthropus pekinensis* popularly

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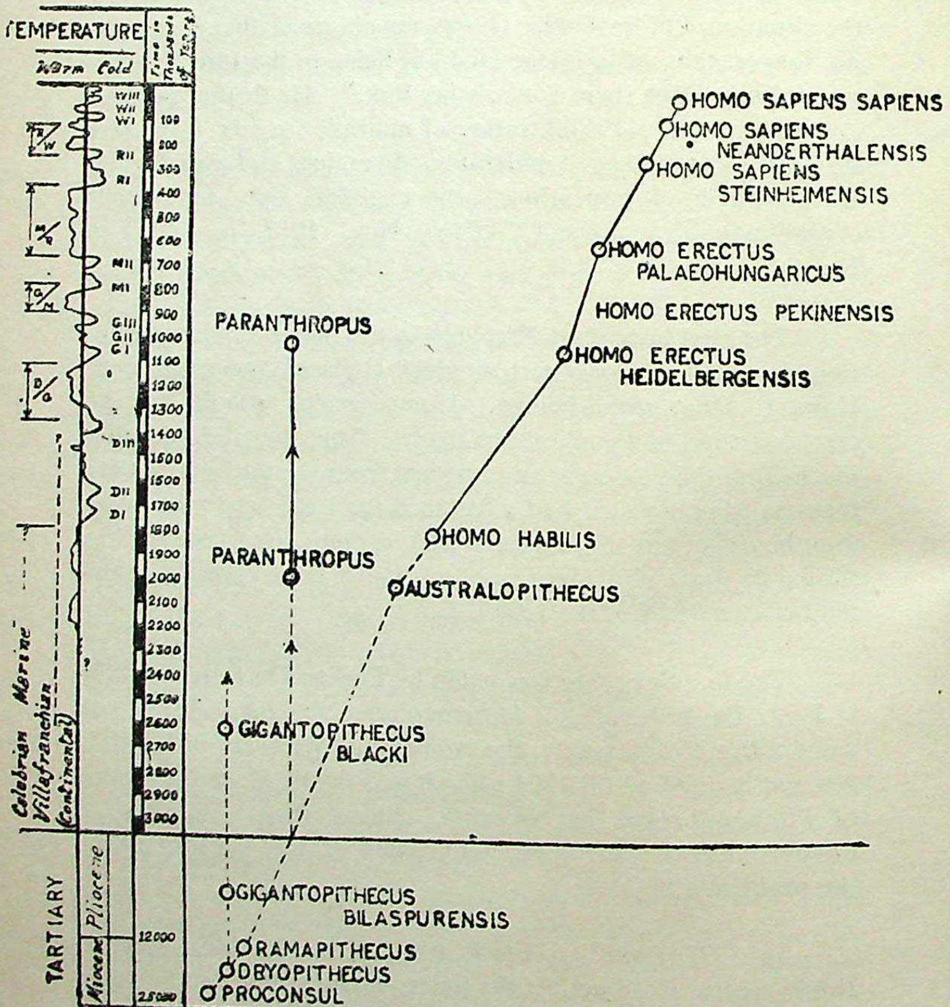

Fig . 1. Evolution of Man
(Idea taken from Day and Jelinek)

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known as Peking man was larger than that of the Java man. The average brain volume of Peking man was estimated as being 1050 C.C. while in case of Java man found much less being 883 C.C. This larger brain capacity may be explained in terms of cultural and physical advancement of the former in comparison with the latter. On ground of their distinctive stratigraphic position also the Java specimen is earlier than the Peking man.

The Homo Erectus fossils from Europe came from a sand-pit near Heidelberg in 1907. The specimen was considered by Prof. Schoetensack (1908) and was named as *Homo heidelbergensis*. It was found that the mandible of the Heidelberg man was similar to that of the Djetis type of Java man.

Tools recovered from the layer of sand-pit were cruder than the tools found along with Peking man. The tools may be classified as belonging to Early Abbevillian type.

Another Hominid fossil belonging to a Homo erectus group came from Verteszollos near Budapest in Hungary in 1963. The specimen was discovered by Dr. Laszdo Vertes. The Scientific name of the Specimen is *Homo erectus palaeohungarius* (Thoma 1966). The estimated age of the specimen is about 600,000 years. In 1968, a small fragment of a molar of Homo erectus was found at a site called Prezletice near Prague. The Geological horizon of the find was Lower Pleistocene and tools recovered along with the find indicates it's much earlier date. So far this is the oldest Homo erectus find in Europe.

During the year 1954–55, fossils remains of Homo erectus were found at Oran near Ternifine in Africa. The find consists of three lower jaws and a parietal bone of a child. Tools found along with the fossils belong to Abbevilles-Acheulian type. The specimen was named as *Homo erectus mouritanius* (Arambourg 1954).

Another important find of Homo erectus come from Swartkrans in South Africa. Robert Broom and Robinson later

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placed the species under the genus Homo and proposed its scientific name as *Homo erectus capensis.*

Louis and Merry Leakey discovered a fossilised skull of a *Homo erectus* from the Olduvai Gorge. The find comes from the upper layer of Bed II at Olduvai. Abbevillian type of tools were found along with the fossil. The fossilman had a brain capacity of 1000 C.C. The scientific name proposed by Heberer (1963) was *Homo erectus leakey.* Richard Leakey, son of Louis Leakey, discovered again a Homo erectus fossil from the sandy deposits exposed in a 'steep gully' near lake Turkana in East Africa (*Time*, Ibid.). The Turkana fossil has a close resemblance with Peking and Java finds and the hominid here had a rain capacity of about 900 C.C.

In the process of human evolution, the Homo erectus people, played a significant role. If bridged the gap between ape and true man which is extremely important for understanding the creatures that veered off from the ancestoral line of apes into evolutionary path and eventually led to the emergence of modern man (Richard Leakey 1975). This line may definitely be considered as the vanguard of human races.

Still the wide range of variation in brain capacity of the Homo erectus people is conspicuous. The highest brain capacity being 1220 cubic centimetres comes from a male skull at Choukoutien and the lowest being 750 C.C. comes from Java. The differences in brain volume is 470 C.C. This may be explained in terms of spatial distance between the two. The fossil remains of Homo erectus people are wide-spread. The distance of Olduvai Gorge and Java is about few thousand miles. It may be assumed on the basis of this widely separated areas that the rate of progress of evolution was not at par everywhere. Somewhere the rate of development was rapid and somewhere it was gradual. Whatever may be the reasons of this range of variation in the brain capacity. It is true that this people slowly but steadily gave rise to a much more developed species which is known as *Homo sapiens*.

The earlier men of the *sapiens* group inhabited this earth during Riss-Wurm Inter-Glacial phase and continued to survive for a long period of time. These people are known as *Homo sapiens neandarthalensis* as opposed to the later representatives of the *sapiens* group, the present day men, the *Homo sapiens*. The name perpetuates the famed site of Neanderthal, a valley in Dusseldorf in Germany.

Among other specimens the fossil remains of Steinheion and Swanscombe skulls reveal an insipient form of the *Homo sapiens*. They come from the 2nd Inter-Glacial period ranging in date between 250,000 to 300,000 years. These two skulls may be placed between the transitional stage of Homo erectus to Homo sapiens and possibly this might have given rise to the fully recognisable Neanderthal people. The distribution of Neanderthal people covers a wide range both in terms of space and time that explains a good deal of differences. From the evidences recovered so far it is aparently clear that there were two lines of development. One is called Early Neanderthal or Pre-Neanderthal and the other extreme or classic Neanderthal (Jelinek 1975). On the basis of fossil finds it may be assumed that the Neanderthal people inhabited certain regions of the old world between 110,000 to 35, 000 years ago. It had receding chin, larger cheeks, prominent brow-ridges connecting over the bridge of the nose. He was short in height but was powerfully built. The Neanderthal people appeared with a new tool kit which is known as the Mousterian industry.

The Early type of Neanderthal man hails from Ehringsdorf in Germany and Saccopastore in Italy. The Ehrinsdorf skull had a brain capacity of 1400 C.C. while the Saccopastore skull had a capacity of about 1200 C.C. It comes from Riss-wurm interglacial period and lived about 150,000 years ago.

Prof. Howel believes that the Early Neanderthals who happened to concentrate on south west part of Europe during the onset of last glaciation became, in course of time, classic Neanderthals. Braidwood too believes that the classic Neanderthals who flourished on the western part of Europe between

85,000 to 35,000 thousands years ago during the last glaciartion, became extinct in course of time as it could not survive the pressure of selection mechanism. Prof. Howel as well as many other scientists believe that the modern men evolved from early Neanderthaloid type.

In 1975 many taxonomists suggested that the Neanderthal man should be classed with other modern man and classified as different only at the sub-species level and hence, it should be called with the present familiar name *Homo sapiens neanderthalensis.* The classic Neanderthal people as already shown were the most distinctive population within the species of Homo sapiens (Birdsell 1975). Despite the attempts to bring them closer to modern man, the differences are enormous both in terms of morphology and analyses of attributes. The Neanderthal man had even larger brain capacity than modern man. They differ significantly from modern man in very many respects. They were characteristically a very short, heavily built and big headed people. The average brain capacity of Neanderthal People was about 1400–1450 C.C. and the largest being 1600 C.C. (*La-Chapple*).

The fossil remains of classic Neanderthals belong to the last Glacial maxima. It comes from Gibralter, chappeleaux-saints, La-Mousterier, La-Ferrassie, La-Quina in France, from island of Jersay, from Hungary, Belgium, Germany, Spain and from Monte Cireo near Rome in Italy. Other important finds from outside Europe comes from Shanidar in Iraq, Tabun, Amud in Near east and from Morocco.

The discovery of Soloman (*Homo sapiens solensis*) from Java, as also the Broken hill specimen and the Saldanah boy from Africa (*Homo sapines rhodesiensis*), has posed a new problem. Jelinek believes that the soloman, the Broken hill specimen and the Saldanha boy obviously represent a branch of development running parallel to the Near Eastern and European Neanderthal men. Koenigswald viewed all these types as belonging to tropical Neanderthal varieities.

Similar types of the aforementioned Neanderthal man and his associated Mousterian culture of western Europe were found to occur all over Europe, as well as in Africa, north of Sahara and across the Middle East. The tools and methods of manufacture are very similar in spite of a considerable amount of difference in climate (John Waechter 1977).

It is assumed on the basis of fossil finds that the early neanderthal type found at Ehringsdorf and Saccopestore which had a close resemblances with Steinheim and Swanscombe finds might have led to the classic Neanderthal of Western Europe and then to modern man. It may so happen that *Homo sapines Neanderthalensis* developed and changed into the present day form of *Homo Sapiens Sapiens* who appeared during the first Wurm glaciation about 40,000 to 30,000 thousand years ago. The famous form of this early modern man are represented by Cro-mainon and Combe capelle type.

CHAPTER II

Problem of Nomenclauture

Since the pioneering work of Robert Bruce Foote, numerous Palaeolithic sites have been discovered so far that practically covers the map of the whole of India and Pakistan. But attempts were not always made to understand the chronology of the industry in terms of Pleistocene geology. Some amount of work was carried out in North-west India by the joint expedition of Yale-Cambridge University where the Pleistocene geology was correlated with the river terrace system.

It is perhaps vital to bring about the historical facts responsible for terminology.

There is a good deal of controversy among general students about the concept of terminology. The prehistoric (including the so called protohistoric) periods were classified as stone and metal ages (Thomson 1836). In metal ages there are further sub-divisions and the constituent units of metal age are copper, bronze and iron. In case of stone age any single perimeter cannot be strictly dealt with as throughout the stone age the primary raw material was stone and it covers an enormous time and space. During this period there were obvious biological and cultural developments and these developments are reflected through the manifestation of industries. Within these industries there are again sub-divisions. On the basis of the technology of flaking on the one hand and chipping, grinding and polishing on the other, Lubbock proposed the name palaeolithic and neolithic periods (Lubbock 1865) to signify as it were two entirely different traditions. An intermediate period between the palaeolithic and the neolithic was proposed by Lyell (1868) and he named it as Mesolithic period. Thomsoe and Braidwood (1971) proposed a three-fold division of stone age culture. They proposed the divisions on the basis of economic schemes *viz.* food gathering (Palaeolithic), food collecting (Mesolithic), and food producing (Neolithic). The three-fold division, as originally proposed by Lyell (1868), is still in vogue in one way or other.

Our prime consideration is on India. Most of the earlier workers on Indian palaeoliths were influenced by conventional European terminologies where the Palaeolithic periods were sub-divided into Lower, Middle and Upper. This European framework of Palaeolithic sub-division cannot be implied in case of Indian prehistory since the Indian situation is quite different from that of the European continent. It has got it's own identity in very many ways. There are also the problem of regional diversities which may often give rise to difficulties. But despite this, right upto the first half of this century the European terminologies and concepts were used in Indian palaeolithic studies.

Subba Rao (1955) tried to Switch over to African terminology where the stone age has been divided into Early, Middle and Late stone ages. As it is true with Europe, differences are also there between African and Indian situation. During the first International Congress on Asian Archaeology in 1961 held in Delhi it was resolved that until a suitable terminology is proposed, the Indian stone age may be divided into Early, Middle and Late stone ages followed by the neolithic. These divisions were followed by many workers like Allchin, Mahapatra, Misra etc.

It may be mentioned here in this connection that endeavours were made by few scholars to propose new terminologies for Indian stone age cultures. In this regard the first attempt was made jointly by Burkitt and Cammiade (1932). They formulated the series concepts (Series, I, II, III & IV). Their series concepts of Kurnool Industries were based on typological and technological peculiarities. The regional classification of an assemblage cannot be operated in a wider area of research. The reappearance of series concept was initiated by H.D. Sankalia who over-emphasised the broad typology ignoring the importance of stratigraphy A fruitless attempt was made by Malik (1964) on the basis of the economic scheme of Braidwood (1961). Some attempts to describe industries with names *viz.* the Madrasian (Menghin 1930), the *Soan* (De Terra and Paterson 1939) for connoting regional characteristics and significance were also made but without any success.

Another attempt was made by Ghosh (1966) for presenting his own concept of terminology. He, on the basis of the form of raw materials ventured to divide the stone age as pebble-core, flake, flake-blade, blade and bladelet elements. But his conceptual framework on terminology is not satisfying as it does not convey any proposition for ascertaining the chronological horizons of cultural stages of the Indian stone age. He over-emphasised on forms of raw materials and that too is not very consistent. For example, the presence of pebble tools and core tools during the use or manufacture of flake-blade elements cannot be ruled out. In fact, the chopper-chopping facies is frequently associated with flakes with or without subsequent trimming.

In India, there is an uncertainties on the early stone age typology. For example in case of chopper and scraper there is a good deal of controversy. The distinction between chopper and scraper is at times superficial. Because the large and massive choppers of the Lower Palaeolithic have become smaller and lighter in the upper palaeolithic. Movius (1948 : 350) while describing chopper/scraper states, "The only essential differences between a chopper and scraper, both flaked by secondary (often resolved) working on the upper surface along one side only, is one of gross size." In this sense large crude scrapers and massive scrapers are called choppers. There is no general rule to distinguish a chopper from a scraper because size or dimension cannot be the only criterion for their distinction.

The terms 'chopper' and 'chopping' for tools are synonymous, both of them indicate the same meaning, irrespective of any criterion (Ghosh 1973). Despite this Movius used the similar terms having the same meaning to differentiate two sets of distinctly separate tool types. D. Sen was the great advocator of Movius's Chopper/Chopping concept. But later on he (Sen 1965) modified his former view and used the older terms of unifacial and bifacial chopper.

In case of handaxes, there are many instances where subtypes are made on the basis of shape or technology or arrangement of flake scars. Such classifications are not often properly explained (Ghosh 1971). For example, ovoidal and oval shape do not make any basic differences. Likewise, triangular, subtriangular, peariform and elongated pear shape at times hardly convey differences. This vogueness is mainly due to non-availability of a basic standard classification. Consequently, we have to face a problem of overlapping. Due to lack of standard criteria of attribute analyses for handaxes, scholars often adopt different types of classification which may suit their specialised investigation and study. For example, few scholars have catalogued handaxes on the basis of their shapes, while others tried to classify these on the basis of technological developments or on the basis of arrangements of flake scars. Joshi has taken the advantages of all these criteria to classify handaxes which instead of giving a proper classification has complicated the situation more. Most of the distinguised prehistorians who have worked either on African or European handaxes have laid more stress on the nature of their shapes which is not always helpful. Whether a progressive pebble tool or a handaxe the acceptance of a standard form may vary at different regions of the world where isolated works are being carried out. Agreeing that pioneers and their dedicated followers have had to work against odds in an atmosphere of indifference for prehistoric research it is felt that an integrated approach should be made to evolve a standard criterion to classify the palaeolithic typology, specially in the sub-type levels. Considering the above problems of terminologies, I prefer to retain the old terms like the Lower, the Middle and the Upper Palaeolithic for making a critical and scientific study of the relevant Pleistocene horizons of cultures in the Indian perspective.

CHAPTER III

A Brief Survey of Indian Palaeolithic Studies

LOWER PALAEOLITHIC

The palaeolithic sites (more specially the Lower Palaeolithic) are found to be distributed in almost all over the Indian sub-continent except Kerala and Assam where the palaeo-environment was not perhaps congenial for the life of early man. The absence of tools may, of course, be also attributed to lack of investigations and the right venture in the field.

The study of Indian prehistory was initiated by Robert Bruce Foote, a geologist, with the discovery of a palaeolithic implement at Pallavaram near Madras in 1863 (Foote 1866) and since then a large number of palaeolithic sites have been discovered. This has practically covered various areas of the map of the whole Indian sub-continent.

On the basis of distribution of sites in term of clustering density India may be divided into five major regions. They are : A. North, B. East, C. Central, D. South, E. West (Datta 1979).

A

Northern Region

This is provided with some basic character as the region is situated in the periglacial tract. As a matter of fact, the glacial and inter-glacial Phenomena in the past must have influenced the culture of this region to a considerable extent. Unlike other regions, here the cultural materials are found in a terrace sequence instead of geo-stratigraphy. The sites are covered both Pakistan and India. The main works carried out here by D. Terra and Paterson (1939), Paterson and Drummond (1962), Graziosi (1964), Krantz (1972), Sen (1955), Lal (1956), Prufer (1956), Mahapatra (1966) and Joshi (1968) are of considerable importance. Most of the sites in this region are situated along the Indus-Soan System, in Nalagarh valley, Kangra valley and in areas on the rivers Beas and Banganga. Tools recovered from this region mainly belong to the chopper-chopping tradition (Movius 1943). The main tool types are unifacial and bifacial chopper, scraper and flakes. It is found that in this region choppers and handaxes are 43% and 41% respectively, while the cleavers are only 16%.

The Singrauli basin is situated between northern and eastern region of India. The major works carried out in this area are by Krishnaswami and Soundara Rajan (1951), and to some extent by G.R. Sharma (1973). Altogether fourty two sites have been discovered in this region. The sites are mainly concentrated in Mirjapur and Allahabad district.

B

Eastern Region

This region has a wider coverage in space dimension. It includes the states of Bihar, Orissa and West Bengal including Singrauli basin. The geo-stratigraphical horizons are more or less similar in this region. The sites are distributed almost all over Chotanagpur Plataeu including the fringe areas in Orissa and West Bengal. The tool types are mainly, choppers, handaxes and cleavers. In Bihar, systematic works were carried out

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by Ghosh (1970), Gupta and Bose (1960). In Bihar most of the palaeolithic sites are located in Singhbhum and Monghyr districts. Fifty two sites have so far been discovered in Bihar. Orissa is perhaps rich in Tertiary deposits specially of Miocene which gave rise to fossil remains of gastria (Bose 1904). But the geological deposits of relevant significance were not properly explored in search of early Hominid fossils (Sen 1978). It is in Orissa that the earliest excavation of a palaeolithic site was conducted (Bose and Sen 1948). Extensive survey work, was, later on, made by Mahapatra (1962) covering a wide area in Orissa. In recent years, Tripathi further explored the area in Orissa. In Orissa, the palaeolithic sites are located in the districts of Dhenkanal, Sundargarh and Mayurbhanj. The sites are about thirty in number.

Save for an instance of the presence of tools of Upper Palaeolithic age on a stretch of sandy deposits on the Ganga to the north of Diamond Harbour in 24 Parganas district, palaeolithic sites in West Bengal are located only in areas that are away from alluvium and deltaic parts. Palaeolithic materials are found in the Chotanagpur fringe area of West Bengal, *viz.* Bankura, Purulia and North-Western parts of Midnapur. Systematic works in this part of West Bengal was carried out by Ghosh (1966), Sen and Chatterjee (1963), Dasgupta (1971) and Datta (1978, 1979). There are altogether sixty three sites. Main tool types are choppers and handaxes while cleavers are very few in number.

C
Central Region

Clustering of sites of Lower Palaeolithic industries are found to occur along the middle course of the Narmada. Most of the parts of the Narmada are covered by this region except the lower course. Other parts of this region comprises of Damoh area. In this regard, the type sites like Narsinghpur, Mahadeo-Pipuria and Hosangabad are significant in all respects. The major works in this regions were done by De-Terra and Paterson (1939), Khatri (1961, 62, 63), Sen and

Ghosh (1963), Joshi (1961, 65, 78), Sankalia (1956), Misra (1978). Fifty four sites have been reported so far. The tool types are mainly chopper, handaxe and cleaver.

D
Southern Region

This region includes the states of Madras, Andhra, Kerala and Mysore. In the history of the study of Palaeolithic culture in India, Tamilnadu (Madras) occupies a significant place. It has already been mentioned that the first discovery of a Palaeolithic handaxe in India was made at Pallavaram near Madras by Bruce Foote in 1863. The Yale-Cambridge expedition made a brief survey in this state (De-Terra and Paterson 1939). Later works were carried on by Krishnaswami (1938), Ghosh (1973), Aiyappan and Manlay (1942), K. D. Banerjee (1957) and few others. The main tool types are chopper, handaxe, cleaver and scraper. The type site of this state is Attirampakkam.

The state of Mysore is, at present, known as Karnataka. The state is mainly drained by Malaprabha and Ghataprabha and most of the sites are located on the banks of these rivers. Major works are carried out here by Burkitt and Cammiade (1932), Joshi (1955), and Pappu (1973). The State of Andhra was explored more or less in an intensive scale by Issac (1960), Soundara Rajan (1952) and many others. The total result of the work is important for the discovery of a large number of sites and the collection of stone tools. The state of Kerala is, so far, devoid of any palaeolithic materials. So it is uptil now excluded from the map of palaeolithic India.

This Southern Region has the maximum number of sites numbering about two hundred seventy seven.

E
Western Region

This region constitutes the states of Western Maharashtra, Gujarat and Rajasthan.

In Rajasthan, the palaeolithic sites are mostly concentrated on its Southern part along the course of the Berach basin. There are also other tributaries such as Gambhiri, Nagan and Kaomali which have yielded palaeoliths. The most significant work in this area was carried out by V. N. Misra (1967).

The state of Gujarat is drained by a number of rivers and quite a number of them have been explored in search of prehistoric culture. The river-system of this country is mainly composed of the Savarmati, the Mahi, the Orsa and the lower Narmada. Major works in this state are carried out by Sankalia (1946, 1965), Zeuner (1950, 1963), Wainright (1964), Ansari and Pappu (1973). The total number of sites discovered in this region is about sixty and the major tool types are choppers, handaxes, cleavers and scrapers.

MIDDLE PALAEOLITHIC

The Indian Middle Palaeolithic forms the second cultural unit of Pleistocene period. It succeeds the Lower Palaeolithic and precedes the Upper Palaeolithic in India, as in various other regions of the world.

Until 1954 the Indian Middle Palaeolithic was not recognised as a distinct cultural unit because the layers above the handaxe/cleaver industries were supposed to be barren. The discovery of the Middle Stone Age industries in the valley of the Soan (Sohan) and Kurnool are exceptions. Burkitt and Cammiade (1932) made an attempt to classify the Kurnool industry on the basis of techno-typological peculiarities and formulated the Series concept (Series I, II, III & IV). But they seemingly overlooked the importance of stratigraphy and as a matter of fact classification of the Kurnool industry remained to the level of contextual analysis. On the other hand De-terra and Paterson (1939) correlated the Soan industries with terrace sequence and successfully demonstrated the different cultural units within Pleistocene period. Before the discovery of the type site at Nevasa (Sankalia 1954–55) numerous specimens of

Middle Palaeolithic tools were picked up from different surface levels of India, but earlier they were regarded either as a constituent part of Lower Palaeolithic culture or the importance of the same were not felt by many workers.

The Middle Palaeolithic phase has been assigned to Upper Pleistocene period (Zeuner 1950). The tools of this phase are usually found in deposits of upper loose gravels. The main characteristic tool types of this phase consist of various types of scrapers, points and Borers usually made on flakes. A number of C^{14} dates suggest the range of duration of this phase between 39,000 to 8,360 B.C. (Agrawal and Kusumgar 1974). This horizon will obviously include within its fold the tools of Upper Palaeolithic tradition. This overlapping may be explained in terms of regional variation or such other forms. This has to be checked properly.

Most of the important sites of the phase under discussion are situated in Maharastra along the banks of the Pravara and the Godavari, Nevasa, Bel-Pondhari, Suregaon, Kalegaon, Nandur-Madneswar, Luni, Mahadeo-Piparia are some of the type sites. From Kalegaon, a tool of this phase was found embeded in the skull of a extinct type of ox, called *Bos Namadicus Felconer* in the thick cemented gravel deposit (Sankalia 1963).

According to V. Jayaswal (1978), the Indian peninsular Middle Palaeolithic which belongs to gravel II deposit constitutes a single cultural unit. Sankalia (1961) proposed the terms "Nevasian" after the type site at Nevasa, to designate the Indian Middle Palaeolithic industries. Following the Nevasian, various regional flake industries were named after it such as "Karnataka Nevasian" and "Orissa Nevasian" to designate the regional peculiarities of the industries. But it does not hold good and does not give a comprehensive meaning as needed. For the convenience of understanding the situation in a wider perspective the naming of regional cultures may not be always helpful.

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The predominent form of raw material of this phase was flake. Zeuner (1957) prefers to call it as flake culture of the Lower Palaeolithic. Dr. Ghosh (1966) has suggested to designate the phase as flake element of palaeolithic period. The Indian Middle Palaeolithic phase is finally established as a distinct and separate cultural unit within the palaeolithic period both in terms of stratigraphy and techno-typology though its actual boundaries are yet uncertain.

The raw materials of this industry differ from region to region and this is mainly due to the availability of the same. In Maharastra, Central India and Saurastra, it was either jasper or chert while in case of Orissa, Andhra, Karnataka and western Rajputana it was either flint or jasper or chert or quartzite (Sankalia 1961). In West Bengal, the materials used during this phase were either quartzite or quartz.

The main distinction of this phase was the introduction of Levallois technique in which flakes were detached after the initial preparation of core. This does not mean that previous techniques like stone hammer or cylinder hammer were ruled out altogether. As a matter of fact, the stone hammer was employed for the initial preparation of the core. As flakes form the major constituent part of the industry, there was a significant change in the tool typology. The discoidal and hollow scrapers, points blades and borers, instead of choppers, handaxes and cleavers became the major tool-types of this phase. During this phase handaxes and cleavers with their advance forms continued for sometime along with the major types. But afterwards they totally disappeared. Though the majority of the tools were made on flakes the presence of core tools may also be noticed in the repertory.

Some amount of works were carried out by K.D. Banerjee (1957) in Deccan. R.V. Joshi (1968–69) worked in Western India. In Karnataka, Issac (1960) made an amount of work, while V.N. Mishra (1961) has his contribution in respect of Rajasthan. Vidula Jayaswal made some statistical analysis in her work on stone age culture of India. In Orissa,

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Mahapatra (1962) did an appreciable work. R.S. Pappu (1974) made some amount of work on upper Krishna basin. Sankalia (1961) initiated the study of Middle Palaeolithic in India and made some valuable field-work and research in Maharastra. U. Singh (1970) made some preliminary report on Middle Palaeolithic industry from Andhra. In West Bengal and Bihar important contributions were made by Dr. Ghosh (1970) and the Directorate of State Archaeology. In North-Western India, the most fascinating and valuable works on stone age were carried by De-terra and Paterson (1939). Khatri (1964) also made valuable contributions on stone age culture in India.

UPPER PALAEOLITHIC

The recognition of the Upper Palaeolithic industries as a representative of district cultural form in India is a recent development. The Upper Palaeolithic in India is characterised by the presence of a blade-burin industry. The problem of fixing the industry to a particular chronological horizon in term of stratigraphy is yet to be solved. In Belan valley and Singhbhum the industries are formed to be confined to a definite stratigraphic situation. From Chittoor (Andhra) Murty (1974) has reported the existence of a blade-burin industry along with bone tools. But here the placing of the industry within the Pleistocene is rather uncertain (Bhattacharya 1972). The only date available for the Upper Palaeolithic in India is 19,715 ± 340 B.C. (Agrawal and Kusumgar 1974). Though the Upper Palaeolithic industries have been reported from a number of places including Andhra, Uttar Pradesh, Bihar and Maharastra, the geo-stratigraphical position and context of the same is uncertain till date. The material used in the industry was either jasper or chert or flint and in some cases quartzite too was used. The main characteristic feature of the industry was the predominance of the flake-blade element (Ghosh 1970).

The Indian Upper Palaeolithic phase is quite different from the European Upper Palaeolithic for more than one reasons :

(1) The European Upper Palaeolithic industry is found to be confined within the Pleistocene period while in case of India, the stratigraphical position is quite uncertain.

(2) In Europe, the Upper Palaeolithic industry is divisible into a number of phases including the Perigordian, the Aurignacian, the Solutrean and the Magdalenian whereas, the Indian Upper Palaeolithic industry is at present a single cultural unit. With regard to the Indian situation certain attempts to associate lithic industries to regions have already been noted.

(3) The European Upper Palaeolithic industry is associated with bone tools, cave paintings and other art works as movable objects while in case of India, the above traits are totally absent or at least they are not clearly known till date.

Of course, the situation in India is quite different from that in Europe and as a matter of fact, there must exist some amount of variation both in terms of material and time dimension since the culture of a particular region is very much conditioned by certain factors like local topography, environment, raw materials, needs and other factors. It will be felt that further careful explorations and excavations may help to reconstruct a clear picture of the Indian Upper Palaeolithic culture. Such field-works and research for ascertaining the exact traits of the material and the relevant bio-stratigraphy wherever possible will establish the importance of the culture on a firm footing. From Belan valley, Prof. Sharma found Upper Palaeolithic industries from Gravel No. III. In Andhra, Murty has recognised the Upper Palaeolithic materials from Ranigunta. In Singhbhum, Prof. Ghosh has found *in situ* flake-blade elements from upper clay. From West Bengal, Upper Palaeolithic tools have been reported from a number of places. Here, the works were mainly carried out by Ghosh, Dasgupta and the author himself.

PART II

CHAPTER IV

Geological and Geo-morphological Features

Considerable amount of work on geological formation in West Bengal was carried out by the Geological Survey of India. The works are confined to earlier periods. But the reports on Quaternary geology which is of prime importance in respect of the scope of our study have not yet been made satisfactorily available to archaeologists engaged in the field.

The works in this regard done so far by geologists and archaeologists which supplied a considerable amount of information regarding the geological beds and the actual deposits from which stone tools have been recovered. On the basis of the above information attempts have been made here to study in brief the geologic formations of West Bengal which have an important bearing with the Palaeolithic studies.

The present work more specifically the Stone Age culture of West Bengal, is primarily concerned with the Pleistocene. The Lower, the Middle and the Upper Palaeolithic industries are covered by this vast period. The later stages that is Mesolithic and Neolithic belong to the Holocene period also described as the Neothermal time, and this geological formation is of recent origin. And as such, there are a number of information relating to the beginning of the Holocene and the nature of depositions in this epoch. But, our prime concern is of Pleistocene period which witnessed, as already observed, the emergence and development of Man.

PLEISTOCENE

The beginning of the Pleistocene epoch is to be considered as 1.5 million years B.P. (Curtis 1965) and the epoch continued till 10,000 years B.P. For estimating the episodes of the Pleistocene obviously we are to depend on the results of scientific surveys and investigations made in Europe and other parts of the world. In the world canvas there is some amount of disagreement about the absolute dating of the end of the Pleistocene and the on set of the Holocene. As the range of variation is between 7,000 and 11,000 years a compromise has been made putting the termination of the Pleistocene at 10,000 years B.P.

It is well-known that the Pleistocene epoch is characterised by a number of episodes which are mostly related with environmental fluctuations. In higher latitudes and elevated altitudes there were successive cold and warm periods. During the former time, the snow-line came down from the high crests and brows of the mountain ranges. The aggradation of glaciers as also corresponding snow-falls and blizzards wrought changes in climatic condition. The huge accumulated snow-sheet began to move slowly along the slopes of the valleys. During the later part of the glacial epoch again there was a change in the climatic condition and the land surface began to warm up. The snow-sheets or glaciers began to melt down and the quauntum of water in the neighbouring rivers increased. In other regions which are away from glaciated area the climatic condition was somewhat different. During this period, these areas alternately witnessed high rainfall and less rainfall that caused precipitations in temperature like similar fluctuations in glacial and inter-glacial periods. This cyclic rotation comprise of pluvial and inter-pluvial periods.

As already noted, the Pleistocene period is of prime importance to the prehistorian. Because during this period our ancestor (*Homo erectus*) appears on earth with his tool kit. Only the western part of West Bengal is considered here as the rest of the State is devoid of Pleistocene gravel deposits. At least they are not exposed or reported. Regarding West Bengal the needed information in relation to geological mapping is unfortunately still lacking. But some amount of information is available in a slightly indirect way on the basis of the study and survey of palaeolithic sites in various river valleys.

LATERITES

In eastern India both the primary and secondary laterites are peculiar formations the exact origin of which is yet to be probed. It may belong to any age of the Pleistocene or even earlier times (Ghosh 1967). The term laterite was suggested by Buchanan (1807) for material used as bricks : "laterite is a quartz bearing clay which contains red and yellow spotted iron compounds in large proportions". Laterite is characterised by the presence of combined silica, which ultimately alters into hydrated oxides of aluminum and iron without combined silica.

In Bengal, the Jurassic and Gondwana rocks are weathered to laterites (Ghosh 1967), Pascoe (1962), identified the following characters as pre-requisite for laterization :

(1) Tropical climate with highly alternate dry and wet seasons,
(2) Flat or sloping land-surface, and
(3) Exposure of rocks of suitable chemical and mineral composition with porous and jointed texture.

According to Blanford (1901) there are two types of laterites. The overlying detrital or secondary variety and an underlying primary variety. The latter which formed *in situ*, is more uniform and appear consolidated. This type is more ferruginous near the surface than below. It ranges in colour from red to yellow and white at depth. The primary laterite never occurs below 2000 above sea level, while the secondary or the detrital variety is confined to coastal lowlands and valleys and depressions (Wadia 1961, Krishnan 1960).

In West Bengal, the district of Purulia, Bankura, Birbhum, Burdwan and parts of Midnapur are widely covered by laterite formations.

Physiographically West Bengal may be divided into four units and they are : (1) the extension of the Chotanagpur Plateau area in the districts of Birbhum, Burdwan, Bankura, Purulia and Midnapore, (2) the deltaic plains of the Lower Gangetic Bengal comprising mainly the district of 24 Parganas, Howrah, Hooghly, Calcutta, Nadia, Malda and Murshidabad besides some of the eastern fringes of the Midnapore district, (3) the sub-montane region in the North comprising of mainly West Dinajpur, Coch Behar and Jalpaiguri. While the district of Jalpaiguri stretches to the Himalayan foot-hills where the landscape is composed of primeval forests and vast river-beds the topography of the other two districts presents flatness of verdant plains, (4) the mountarous region of Darjeeling districts (Fig. 2).

Prof. K. Bagchi (1944) has rightly pointed out that "the greater part of the districts of Bankura, Purulia, Birbhum and the Western half of Midnapore is a continuation of the Chotanagpur Plateau to the east and the present surface of the region has been derived mainly by the process of degradation of the table land". This region of West Bengal is important for more than one reasons. Primarily, all the palaeolithic sites are located here and secondly, this tract of land is considered to be the old land mass of West Bengal. Major rivers like the Suvarnarekha and the Kangsavati in this region have shown the successive deposits of two major types of plastic sediments. The sediments contain cobble/pebble/gravel and sand/slit/clay.

Other important feature of this region is the occurrence of both primary and secondary laterites. The primary laterites

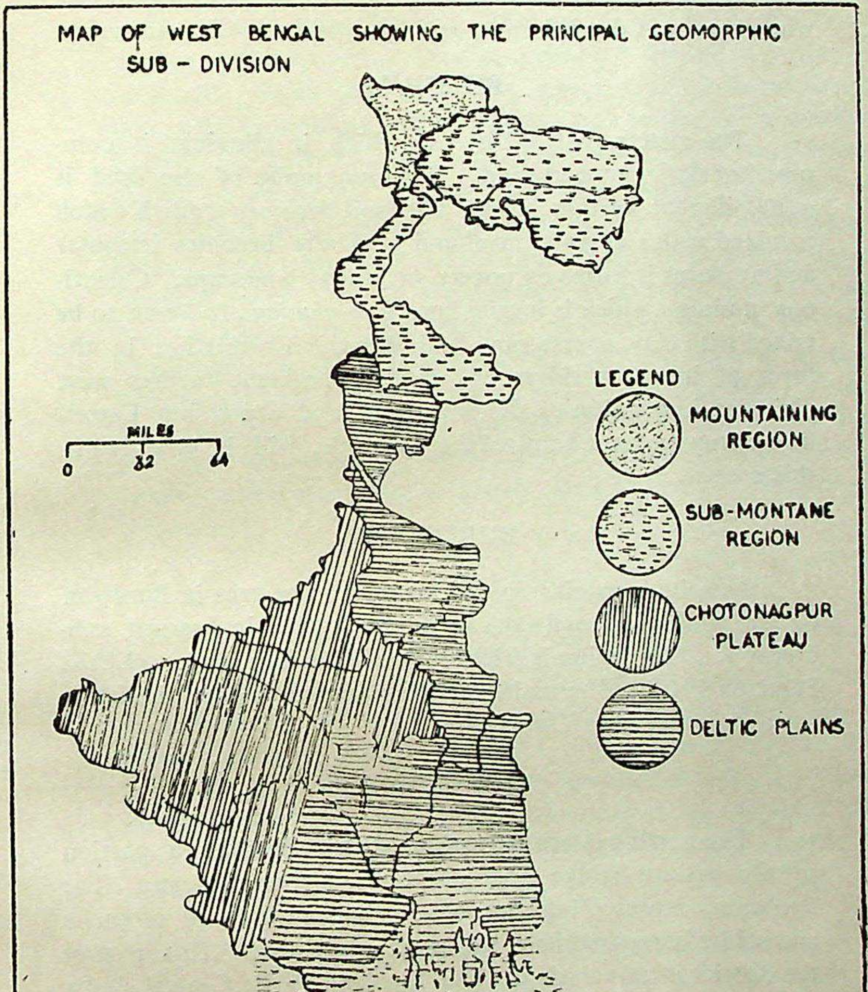
MAP OF WEST BENGAL SHOWING THE PRINCIPAL GEOMORPHIC SUB - DIVISION
MILES
0
32
64
LEGEND
MOUNTAINING REGION
SUB-MONTANE REGION
CHOTONAGPUR PLATEAU
DELTIC PLAINS

Fig. 2

are found to occur on the old rocks at whose expense it has been formed. The secondary laterite of the detrital form is stretched over a vast area in this region. The detrital laterites are found mixed with pebbles of quartz, feldspar and other rocks. The laterites are one of the characteristics phenomena of the Pleistocene epoch although the origin of the same is not definitely known. In Bengal this rock when hard and dry is known as *Makra pathar* or *Jhama pathar*.

BIRBHUM

The eastern part of Birbhum which is alluvium is composed of dark clay and sand. The topography of the land is quite different further west. The soil becomes reddish which is mixed with clay and gravel and gradually becomes irregular and at places it forms an uneven or graded landscape. Calcarious nodules which is locally known as *ghuting* are found to be mixed with clay, coarse sand and gravel. Undulation in the form of irregular ridges are more prominent further west giving an impression of alternate ridges and depression. Lateritic outcrops over a hundred feet in height will be observed in this area.

BURDWAN

Laterite deposits spread over a large area in Burdwan district while the Gondwana rocks are exposed in Asansol subdivision. This region is rich in coal bearing seems (J.C.K. Paterson 1910). The main lateritic outcrop of the district is found to occur near Durgapur.

MIDNAPORE

The north-western part of the district includes a portion of the eastern fringe area of Chotanagpur Plateau. The *Archaean*, representing the oldest rock, in the form of gneiss and schist is exposed here and there in the area. This part of the district is undulating. The highland of the Central India terminates here in large rolling formations of laterite. The whole land-surface consists of alternate ridges and depressions. The main lateritic outcrop of the district is found to occur in Jhargram sub-division.

BANKURA

The greater part of the district of Bankura is covered by both laterite and alluvium deposits. The *Archaean* rocks in

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the form of gneiss and schist stone are found to occur in the Western part of the district. Sedimentary rocks of Gondwana system are found to cover the area between Mejhia and Beharinath hills. Dolerite dykes of Mesozoic origin are found to cut across the Gondwana and Archaean rocks in the north-western parts of the district. The gneisses are sometimes found to cut across in places by granites and vein quartz. The laterites inter-spread with sand and gravel forms the most characteristic geological features of the district. Two types of laterite are found to occur. The *in situ* detritus of laterite which forms hard, massive beds and blocks; originated by the residual weathering of the underlying rocks and the laterite gravels which results from decomposition and re-arràngement of the massive laterite. Calcarious nodules locally known as *ghutting* are often found mixed with laterite. These nodules of the upper horizon seemingly refer to a climatic phase of the Lower Holocene.

PURULIA

This area is the extension of Chotanagpur Plateau. The *Archaean* rocks in the form of granites and schists are found to occur in the district. The sedimentary rocks of the *Archaean* group including slates are found in the district. There is a chain of hills in the Western part of the district that may vouch for an eroded mountain. Thus among others the Ayadlya hill is a monad rock which stands in a typical landscape composed of bad lands.

PALAEONTOLOGICAL REMAINS FROM WEST BEGAL

The material culture of man in this part of West Bengal during the dim past was rich which is evident from the abundance of stone tools scattered all over the south-western part of the state. During that dim past life was not secure as it is today. Man had to survive in a different kind of ecology. The discovery of numerous fossilised skeletal remains of animals from the region around the Susunia hill in Bankura district speaks of a different environment. The fossils have been assigned to an epoch of the Pleistocene period when this region had forests and water-logged areas evidently after a Wet Phase will eloquently vouch for an animal kingdom in this part of West Bengal. The animals represented by the fossils once roamed the highlands of West Bengal. Some of these animals, mostly vertebrates, appeared and disappeared while some others were succeeded by new ones of the same families. All the information relating to the fossil vertebrates were supplied by Mr. P.C. Dasgupta (personal communication). The specimens had been referred to examined and identified by the Geological Survey of India. Important fossils were further discovered from other regions of the State by the Directorate of Archaeology. The fossilised remains of animals of the Pleistocene epoch referred to were for the first time discovered by the Directorate of Archaeology, West Bengal in 1966 and 1969. This discovery was followed by comparable discoveries made by the Palaeontologists of the Geological Survey of India. Some fossils were also recovered afterwards from this area by the *Paschim Banga Paribrojak Samity*. The fossils belonging to the Pleistocene period came from the following places :

1. Susunia :

The bulk of the fossils were recovered from this region by the Directorate of Archaeology, West Bengal under the direction of P.C. Dasgupta its Director. Most of the specimens were recovered from deposits along the river Gandhesvari and other streams and *nullahs* (*jors*), where water flows over a considerably steep gradient during the rains. The horizon of the finds is assigned to the weathered sandy silts of the Pleistocene period. All the finds have been closely examined and identified by the Palaeontology Division of the Geological Survey of India in their Central Palaeontological Laboratory in Calcutta. The find includes: *Probosbidea, Rodentia, Carnivora, Equidea, Bovidea, Cervidea, Suidea, Crocodilia* and *Chelonia* (Sahstry 1968). The specimens are identified as :

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	Identification		*Description*
1.	*Palaeoloxodon namodicus*	...	Elephant
2.	*Bos namadicus*	...	Oxen
3.	*Bubalus palaeindicus*	...	Buffaloe
4.	*Equus namadicus*	...	Horse
5.	*Panthera cf. leo*	...	Lion
6.	*Sus cf. cristatus*	...	Pig
7.	*Crocuta cf. sivalesns*	...	Hyena
8.	*Hystrix sp.*	...	Porcupine
9.	*Crocodilia*	...	Crocodile

Among the above finds, the most important are such specialised carnivores as *Panthera cf. Leo* and *Crocuta cf. Sivalensis*.

Panthera cf. Leo

This Speciman has been identified and described by A.K. Datta (1976) of the Palaeontology Division of the Geological Survey of India. The mandible of the animal containing the molar and fourth premolar of the speciman are preserved. The geological horizon of the find is Pleistocene. The find was reported from deposits near Susunia hill.

The Susunia specimen (*Panthera cf. Leo*) has close resemblance with the living specics of lion and tiger. The animal is closer to lion than tiger and even it is bigger than the present lion. The fossil will recall the similar specimen found earlier in Kurnool cave.

Crocuta cf. Sivalensis

This specimen has been identified and describe by A.K. Datta (1976).

One left mandibular containing molar, three premolars and one canine had been found near Susunia in the Pleistocene deposits of the area. The specimen has been identified and described by A.K. Datta (1976).

The Susunia specimen closely resembles with the Siwalik from of *Crocuta Sivalensis.* It is slightly bigger than Siwalik specimen but much bigger than *C. Crocuta*, the living African Spotted hyena. The Siwalik Specimen appeared in Pinjor horizon of Pliocene. The spotted hyena (*Crocuta cf. Sivalensis*) lived over an wide area of Africa, Europe and China and dominated till the end of the Pleistocene and was finally restricted to only Africa at present. *Crocuta* has probably migrated from Siwalik to Susunia regions during the Pleistocene period due to unfavourable climatic condition and scarats of food.

It is of internst to note that spotted hyena now restricted to Africa has it's origin in India, while the striped hyena mainly restricted to India today had it's origin in Africa (Kurten 1968).

Report on vertebrate fossils from Pleistocene deposits near Gopiballavpur, Midnapore as communicated by Shri M.V.A. Shastri of the Geological Survey of India to the Director of Archaeology West Bengal.

The collection consisting of 10 vertabrate specimens and 3 lime concretions comes from Beldhia and Jahanpore near Gopiballavpur in Midnapore district. All the specimens have

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This report was prepared by the Geological Survey of India after examining the fossils submitted by the Directorate of Archaeology for identification.

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been examined and identified by A.K. Datta, Palaeontological Division of Geological Survey of India.

	Identification		*Description*
1.	*Bovidae*	...	Molar broken
2.	*Bos Sp.*	...	Lower left ramus M_3—M_2
3.	*Bovidae*	...	Lower M_3 broken
4.	*Bovidae*	..	Astragalus (Recent)
5.	*Bovidae*	...	Molar broken (Recent)
6.	*Bovidae*	...	Molar broken (Recent)
7.	*Rodent*	...	Skull and jaw (broken)
8.	*Rodent*	...	Skull and jaw (broken)

According to A.K. Datta of Geological Survey of India, "it is difficult to assign any definite age to the deposits containing these animal remains. However, this alluvial deposit can tentatively be assigned to Pleistocene age".

Report on Vertebrate fossils from Pleistocene deposits near Mochpol (Discovered by the Directorate of Archaeology, West Bengal)

The Specimen consists of 6 fragments of animal fossils found from Pleistocene deposits near Mochpol. The specimens were examined and identified by the Zoological Survey of India.

Specimens	*Identification*	*Description*
MPL No. 1	*Trionyx gangetius cuv*	A fragment of plantron.

Specimens	*Identification*	*Description*
MPL No.2	*Sus scrofa linnacus*	A fragment of left mandible with 2 premolar.
MPL. No. 3	*Axis axis erxl*	broken antler
MPL. No. 4	*Box cf.*	3rd left molar
MPL. No. 5. 6	*Namadicus Falconer*	2nd upper left molar and one broken upper molar.

Report in Vertebrate fossils from Deulpota, 24-Parganas (Discovered by the Directorate of Archaeology, West Bengal)

The specimens comprising 3 vertebrate fossils were found from Deulpota, near Diamond Harbour. The specimens were examined and identified by A.K. Datta, Palaeontological division of Geological Survey of India.

Sp. No.	*Identification*	*Description*
01/400	*Elephas cf. Indicus*	Broken molar with two and half ridge palates.
01/401	*Elephas cf. Indicus*	Broken molar with six ridge palates
01/402	*Cervus sp.*	Broken horn.

From the above description, it is clear that West Bengal during the distant past had a rich animal kingdom. Different types of animals during the Pleistocene period frequented this part of India. Vertebrate fossils have been recovered from the region of Susunia, the terrain to the south of the west Suvarnarekha, Mochpol and Deulpota. Further, skeletal remains of animals revealing different grades of replacement (*i.e.* fossilisation) have been discovered on the eroded banks of the Rupnarayan at Natshal and comparable sites to the south of Tamluk (ancient Tamralipta) in Midnapore district by the Directorate of Archaeology. It is intersting to note that while Susunia, Suvarnarekha and Deulpota have yielded stone tools, the region of Tamluk, on the other hand, has yielded microliths, neoliths and bone artefacts. The collections of fossils vertebrates from Susunia includes a number of animal types. It is also interesting to note that elephant, lion, oxen, buffaloes, horses and spotted heyna once roamed the Susunia region during the Pliestocene epoch. It may be assumed on the basis of these faunal evidences that Susunia region had a forest ecology with well-watered resources. The *Hominids* who lived in this region during that time used to flake stone tools both for offensive and defensive purposes. They had to keep a constant watch on the movements of animals. One may wonder how this present bleak and dry mountaneous terrain that stretches over a wide area could offer resources for life and cultures of early man in the dim prehistoric past. It is also of immense interest to note that the lion now restricted to the Gir forest of Gujarat and which survived in the region of Palamau, Bihar in the last century and the spotted heyna (*Crocuta cf. Sivalensis*) that migrated to Africa once dominated over the area.

From the eroded terrain to the south-west of the Suvarnarekha have also been found a number of fossils of animals that indicate markedly a different climatic condition from that of the present day. The animal fossils recovered from this area include those of bovids and rodent. According to Blanford, "The earliest historical record of lion in India is from early nineteenth century when it was known to live in the North-Western, Central and Western India. In mid-nineteenth century it was common near Mt. Abu, Gwalior, Kota and between Songar and Jhansi and eastward as far as Rewa and Palamau. Since the later part of nineteenth century the existence of lion became restricted to the Gir forest in Gujarat (Blanford, 1888-91, p. 53)." Though the number of specimens recovered from this large area does not indicate varied types still they indicate a different palaeoclimatic condition during the Pleistocene period. It may be assumed that this area along the river Suvarnarekha was rich with savannah or plant life with well-watered valleys and resources that could support animals. The present arid and lonely highlands that were the resorts of early food-gatherers, the user of palaeoliths, will evoke one's imagination regarding vanished epochs of the quaternary and a lost fauna.

Fosil vertebrates from Mochpol 24 Parghanas, include *Bos cf., nomadicus, Cervidae bovidae*. This is also indicative of the fact that during the Pleistocene period this area had also a different kind of environment which was very much favourable for the survival of man.

The region of Deulpota with its sand deposits near Diamond Harbour which has been generalised so long as belonging to the recent alluvial formations has also yielded vertebrate fossils of *Elephas Indicus*. The Upper Palaeolithic tools as well as fossilised skeletal fragments of vertebrates from this region have definitely pushed back the history of this region to the epoch of the Pleistocene period.

Report of fossil man in West Bengal

A human fossil consisting of a mandible with some teeth was collected by P.C. Dasgupta, Director, State Archaeology from the east of Sijua Village on the left bank of the river Kasai about 8 km west of Ramgarh in Midnapore district. The specimen was submitted to the Central Palaeontological Laboratory of the Geological Survey of India in Calcutta for identification. Subsequently, the area was visited by A.K. Datta and S. Biswas of Geological Survey of India and P. C.Dasgupta to ascertain the geological horizon of the specimen. The specimen was closely examined, identified and described by A.K. Datta and S. Biswas who worked under M.V.A. Sashtri, Director, Palaeontology and Stratigraphy Division, Geological Survey of India. It was observed that the area comprise extensive pluvial deposits forming terraces. Two kinds of depositions were observed by the geologists. The former being older, consisted of pinkish red and coarse grained sand and the latter being younger is filled up with yellow sand with a gravel layer at the bottom. The red silt has been correlated with the Baltora formation of Late Pleistocene age and the yellow sand has been identified with the Babladanga formation of early Holocene age in Bankura district (Sashtri 1976).

The specimen is reported to have been collected from the lower part of the yellow sand which is about forty feet below the top surface.

The specimen (k 57/427) consists of a fossilised mandible with right first and third molar and left first and second molars. The specimen has been identified as *Homo sapien sapien*. It has been suggested that the fossil belongs to an young individual ranging in date between 17 to 23 years.

The fossil of *Homo sapien sapien* had earlier been reported from Narmada valley by Theobald (1881). But this specimen is supposed to have been lost from the Asiatic Society of Bengal. However De Terra and Paterson (1937), suggested that the specimen perhaps belonged to the Late Pleistocene period. In India there is no such other earlier record of *Homo sapien* finds.

The present specimen from Sijua has been compared with the fossil finds from Mohenjodaro and Harappa and it appears that the Sijua specimen is much older. M.V.A. Shashtri has tentatively assigned the Sijua specimen to the Lower Holocene (approx. 10,000 years B.P.). It has also been opined that this is perhaps the earliest record of human fossil in India.

The Sijua fossil is an important landmark with regards to the human evolution in India. India is so far devoid of any true hominid fossil. The discovery of *Homo sapien sapien* from Sijua will initiate reserarch for finding out true hominid from this part of India in near future.

The dearth of true hominid fossils from this part as well as the rest of India is indeed an ambiguous problem. While it is satisfying to observe the presence of artefacts a corresponding difficulty is experienced at the same time in the absence of the fossil man who made and used them. The author personally does not believe in the theories put forward by many scientists to explain the reasons of non-availability of hominid fossils. Men must be there and some of this fossils should remain still preserved beneath the earth. We must have to find out the shelter where he used to live. It might be a cave or some other corner, because right from the very beginning there was a need of security which ultemately led him to be civilized. This urge for security of the foodgathers as well as other natural forces must have forced them to live in sites having natural protections. One has to find out such places for the early records of the hominids.

CHAPTER V

Distribution of Sites and Emergent Zones

The main characteristic feature of West Bengal is her panoramic landscape that include weathered hills or verdant plains over a wide area. The boundary of the state relegates within the fold of the Sub-Himalayas in the north while its southern limit is defined by the Bay of Bengal. The history of Man and his culture in such a region is perhaps as facinating as engimatic especially in respect of her old history.

Since the discovery of palaeolithis by Valentine Ball as far back as 1883 in Bankura region no attempt was practically made to initiate prehistoric research in Bengal for about a century. It was only in 1960 that the Department of Anthropology, Calcutta University, and the State Directorate of Archaeology[1] came forward for systematic explorations in the field. Though a considerable amount of work was done by the Department of Anthropology and the Directorate of Archaeology. But unfortunately the works carried out so far by the Directorate of Archaeology, Government of West Bengal in the field of prehistoric research could not produce any good results. Neither

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1. D.K. Chakraborty, S.C. Mukherjee, Sudhin De and other staff members of the Directorate worked under P.C. Dasgupta

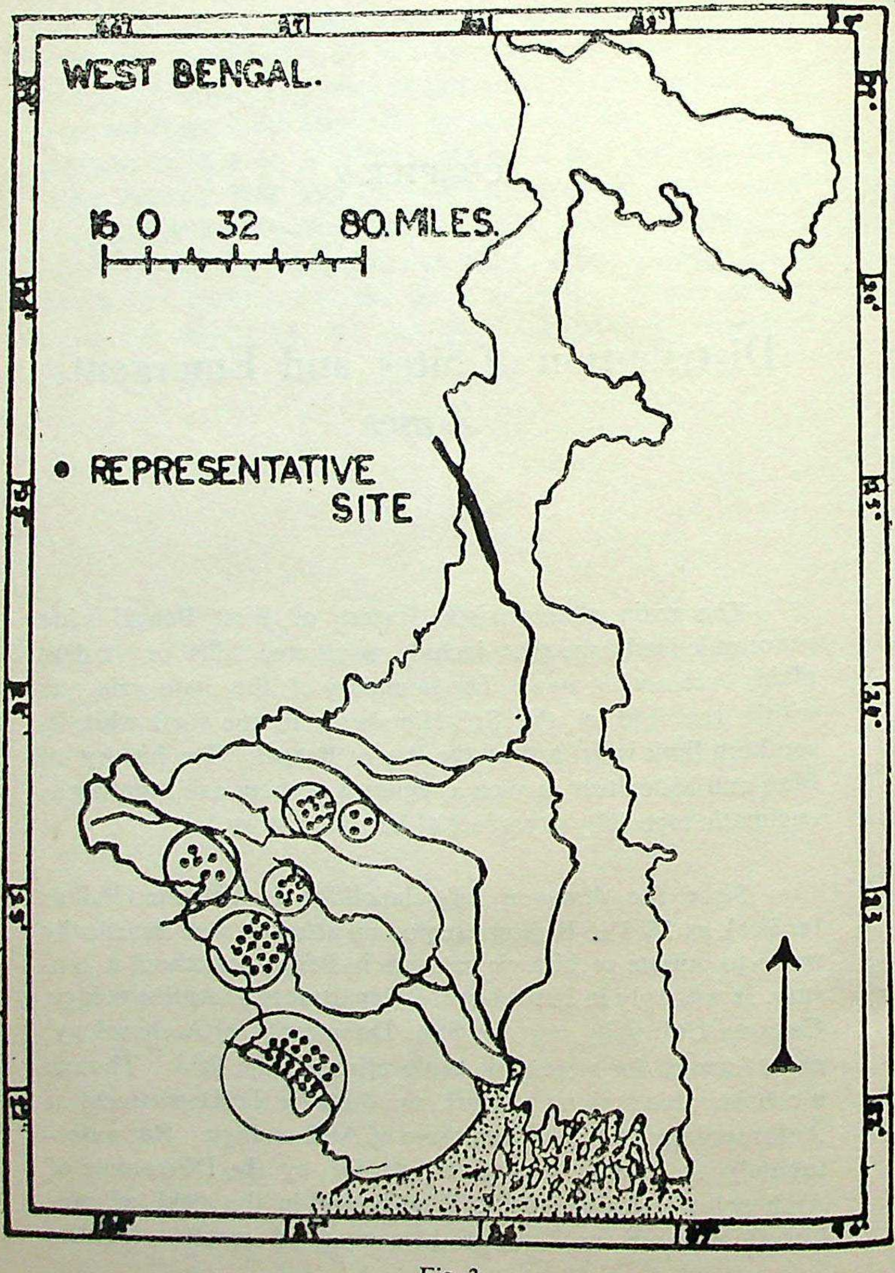

WEST BENGAL.
16 0 32 80 MILES.
• REPRESENTATIVE SITE

Fig. 3

it did pay any attention to the publication of materials nor it followed any scientific methods in the field.

In West Bengal the palaeolithic sites, specially Lower Palaeolithic industry, are found to be distributed over a wide area. But the concentration of sites is found to occur on south-western part of the State which includes the districts of Bankura, Purulia and parts of Midnapore. It is significant to note that the sites are found along ancient rivers, streams and streamlets. Such location will no doubt speak of the urge of prehistoric hominids to live and survive and to hunt wild animals at vantage points.

In the present work only the western part of the state is included because the rest of the country is devoid of any Pleistocene deposits. At least they are not exposed.

The implementiferrous distircts of Midnapore, Bankura, Birbhum, Purulia and parts of Burdwan were extensively explored by a number of scholars like V.D. Krishnaswami (*IAR* 1959–60), Ghosh (*IAR* 1963–64), P.C. Dasgupta (*IAR* 1962–64, 1963–64, 1964–65, 1968–69), Ghosh (1966, 1970), Sen and Chatterjee (1963), Das Gupta (1971), and Datta (1978, 1979).

The palaeolithic sites in West Bengal are found to be distributed among the following regions and areas (Fig. 3) :

1. The eroded terrain to the south-west of the river Suvarnarekha.
2. Belpahari region along the river Tarafeni.
3. Kankradara on the river Kangsavati.
4. Matha forest zone and places on the streams Hanumati, Amruhasa, Nangsai and Bandu.
5. The eroded and graded highlands around Susunia hill flanked by the river Gandhesvari and other streams and *nullahs* (*jors*).
6. Biharinath flanked by the river Damodar.

7. Lalgarh on the Kangsavati river.
8. Bonkati on the river Ajay.

1. THE ERODED TERRAIN TO THE SOUTH-WEST OF THE RIVER SUVARNAREKHA

This region is extremely important in terms of research on palaeoliths in West Bengal. It may be mentioned here in this connection that the officers and staff of the State Directorate of Archaeology in 1969 had first brought to light more than a thousand of Lower Palaeolithic artefacts from high terraces and cliffs of *nullahs* of this area and since then innumerable specimens have been collected from here. The specimens range in variety from highly pebble tools or chopper/chopping groups to advanced handaxes and cleavers. The importance of the terrain along the Suvarnarekha lies in the fact that from here we get two sets of tools, one is rolled and patinated while the other is relatively fresh indicating a very slow evolution or progress in terms of technical advancement and rate of development. The density of occurrence of palaeolithic tools in the region is highly significant. The seemingly slow and gradual development or transformation from the patiently hewn pebble chopper to the symmetrical pebble butted handaxe can perhaps be demonstrated here. The regions stretching over a wide area along the valleys of Suvarnarekha were extensively explored by the State Archaeology under the direction of P.C. Dasgupta. The exploration led to the discovery of a number of prehistoric sites along the Suvarnarekha valley. The important sites are :—

a. Karkota	This area covering the cliffs and eroded uplands at the fringe of a forest on the western side has yielded pebble tools, handaxes, flake tools and microliths.
b. Karbhaga	This area which is close to the stream Pitanau within a deep and arid forest has produced pebble tools of quartzite and microliths of chert.

c. Chhoto Tarki	This area comprising the lofty cliffs and hill-slopes on the stream near Dhankamla has yielded microliths and pebble choppers on quartzite.
d. Rangamatia forest	This area comprising the dried-up sandy bed of Singari jor has yielded pebble tools from gravel beds.
e. Ghorapincha	Palaeolithic handaxes and pebble implements were picked up from laterite. A beautiful cleaver with oblique cutting edge and a drooping corner was discovered from here. From Hatimara and Ghorapincha, beautiful specimens of Abbevillean and Acheulian handaxes and Middle and Upper Palaeolithic tools were recovered from here. The density of occurance of palaeolithic tools within and area of about 100 m. was found to be of real significance not only for the close proximity of Ghorapincha to Hatimara but also due to its nearness to Suvarnarekha.
f. Phulbani	The Phulbani region comprising the forested tract towards the Suvarnarekha across Dhankmta is dissected by deep *nullahs* and beds of streams. The broken upland yielded Lower, Middle and Upper Stone Age artefacts.
g. Indbera	This area is often undulating. The lateritic outcrop of this region was mostly covered by loamy earth.

	The cliff section is often about 10 m. high with kaolinized formation. From the vicinity of Hatimara and Ghorapincha pebble tools, handaxes and flakes were recovered.
h. Patina	The terrain of Patina represented by deep *nullahs*, cracks and a broken lateritic topography sometimes as high as about 15 m. from the bed of the main stream which dries up like many other streams and *nullahs* of the region during summer. The tools recovered from here include both palaeoliths and microliths.
i. Mantapani	The vast panorama of the region present an idea of a desolate valley hemmed by golden sand dunes of Suvarnarekha. The area has yielded pebble tools, handaxes and cleavers.
j. Ambha	This area has yielded several important artefacts including a rolled Acheulian handaxe and pebble tools belonging to Lower Palaeolithic industry.

The important sites in this are as follows :

1. Karkota, 2. Krabhaga, 3. Choto-Tarki, 4. Rangamatio Forest, 5. Kurumbera Forest, 6. Amjur, 7. Hatimara, 8. Ghorapincha, 9. Sita Jor, 10. Phulbani, 11, Chandavilla, 12. Indbera, 13. Patina, 14. Mantabani, 15. Bhaduahuri, 16. Chhatinasole, 17. Baliadahar, 18. Raikan, 19. Dumuria, 20. Kuthighat, 21. Sasra, 22. Jhili, 23. Dahamura, 24. Somra Khal, 25. Jhara-

para, 26. Askala, 27. Ambha, 28. Urbhanga, 29. Pitanau, 30. Bhan Do Dihi, 31. Bhagasole, 32. Chuadara, 33. Teghari, 34. Tapavana, 35. Krishnapur, 36. Kestabone, 37. Muransole, 38. Kantabone and 39. Gopalpur.

This region is considered as the extension of Mayurbhanj area of Orissa. The major works in this area were carried out by the Directorate of State Archaeology (1969) and Ghosh (1964-65).

2. Belpahari Region

This region comprises Belpahari and Lalgarh areas. Systematic works on palaeolithic studies were carried out here by Ghosh (1966), V.D. Krishnaswami (*IAR* 1959-60) and Datta (1979) while a number of other scholars like D. Sen, N.K. Bose and P.C. Dasgupta have also worked here. The lithic industry found from Quarternary deposits are choppers, handaxes, cleavers and scrapers. The concentration of tools in Belpahari area are found from the following sites :

a. Bamandih	This area comprising the cliffs and hill slopes near the river Tarafeni has produced a number of Stone Age artefacts. The artefacts include handaxes, choppers, cleavers, scrapers on quartz or quartzite and microlithic tools on cherty quartz. This area also produced Middle and Upper Palaeolithic and Neolithic tools. The prepondarance of stone tools here are highly significant and indicative of the fact that this area might have served as factory site during the distant past.
b. Belpahari	This is also an important site not only because of its close proximity to Bamandih but because of its

innumerable stone tools of both Lower, Middle Palaeolithic and microlithic tools. This region comprising a number of hills is the extension of the Chotanagpur fringe area. The primary raw materials are abundant here in the form of cobble/pebble. This is also interesting to note that all most all the tools found from here are made either on quartz or quartzite which tends to indicate that the hominids of this area achieved master technology over the materials. Quartz/quartzite are hard materials next to diamond, and unless one achieves better technology it becomes really difficult to get the desired shape out of this materials. As a matter of fact, the hominds of this area comprising north-west Midnapore must have achieved complete control over the flaking technology. Palaeolithic tools found from this area comprises chopper, handaxes, cleavers and scrapers.

c. Dhuliapur

This region comprising the high chiffs of a stream of the main river Tarafeni, is close to the village Dhuliapur. Most of the surface of the area is undulating giving an impression of alternate ridges and depression. The Archaen rocks in the form of schists are exposed here and there. The clustic sediments in the form of gravels/silts and sand/silt of Pleistocene phenomenon are found to occur in the cliff section of the stream. Tools of Lower, Middle Palaeolithic, microliths and Neoliths have been found from here. The tools were found from *in situ* and high cliffs, It includes handaxes, choppers, cleavers and scrapers of Lower Palaeolithic industry.

The important sites of the area are :

1. Astayuri, 2. Bhedaku, 3. Bamandih, 4. Nayagarh, 5. Sildah, 6. Belpahari, 7. Palasdanga, 8. Rajdaha, 9. Dhuliapur, 10. Banspahari and 11. Saragdihi.

B. Lalgarh area

This area on the bank of Kasai has yielded a chopper and cleaver of fossil wood amidst huge deposits of red silts belonging to late pleistocene. It may be noted here in this connection that the red silt deposition of Lalgarh area has been correlated with Baltora formation of Bankura (Sashtri 1976) and the geological horizon of the red silt deposits has been assigned to Late Pleistocene period. This fossil tools recall the similar tools recovered from Bankati. This area is important not because it has yielded fossil tools but because it has produced the earliest record of fossil man (*Homo Sapien sapien*) in India.

3. Kakradara Region

This region was earlier explored by V.D. Krishnaswami along the bank of Kansai and its tributaries of Kumari and Jam in the district of Bankura and Purulia. Krishnaswami has located 17 Palaeolithic sites on the river Jam and 15 on Kumari respectively. According to him the area has yielded pebble-butted handaxes and cleavers. The *in situ* tools were recovered from gravel bed which is about 5 feet thick.

A recent exploration undertaken by the Directorate of Archaeology in the same region has yielded Lower Palaeolithic artefacts, from the gravel bed which is about one metre thick. The tools include handaxes, cleavers and other artefacts. The important site of this region is Mukutmanipur. The tools of Lower Palaeolithic comprising handaxes and cleavers are often found embeded in a matrix of gravels and red silt.

4. Matha Forest Region

The region comprises the south-western part of Purulia district. Regular field investigations initiated by the Directorate of Archaeology has yielded Lower Palaeolithic materials. The tools comprise mostly handaxes and cleavers. The close proximity of the regions to Bihar are marked with similarities of data from North Bihar sites like Monghyr.

Tools are found from the following sites :

1. Matha forest, 2, Hanumati, 3. Sakha, 4. Amruhasa, 5. Nangsai, 6. Bandu, 7 Muri, 8. Bhanrasia, 9. Bagmundi, 10. Jaychandi, 11. Likisaira, 12. Deul Tarn.

5. Susunia Region

This region comprises the Susunia hill regions. A systematic explorations were carried out here by the Directorate of State Archaeology resulting in the discovery of a few thousand lithic artefacts amidst the silts and gravels around Susunia hill.

But no attempts were made to understand the stratigraphy interms of pleistocene geology. As a matter of fact, the palaeoenvironment of the region during the dim past remained unreconstructed. It is quite interesting to note that the occurrence of choppers and cleavers from this area are almost nil.

The sites in Susunia region are as follows :

1. Halikheda, 2. Chiada, 3. Baddih, 4. Uparson, 5. Mukurbani, 6. Bankajor, 7. Purulia, 8. Patharghata, 9. Sohagjor, 10. Hapania, 11, Bisinda, 12. Pencha Simulia, 13, Susunia, 14. Suliban, 15. Simulberia, 16. Kuilara, 17. Dhankera, 18. Ramnathpur, 19. Balikhua, 25. Bandina, 26. Jalgalia, 27. Nathkamla, 28. Gidhuria, 29. Babladanga and 30. Nathla.

Bankathi

This area comprising undulating lateritic blocks, has produced Lower Palaeolithic tools of fossilised wood. The tools comprise of adzes, choppers and one handaxe. The fossilised wood tools might have had some similarities with Anythian tools of Burma (P.C. Dasgupta 1967).

6. Biharinath Region

The potentiality of Biharinath hill region, which is very close to Susunia hill, was first mentioned by Velentine Ball during the last half of the last century. The area was extensively explored by the author which yielded in the discovery of a large number of palaeolithic tools. The most interesting among them is the discovery of two pick axes. The tools include handaxes, scrapers and picks. The important site of the area is Ghutingdanga at the foot hills of Biharinath. The tools have been recovered from the gravel sheet that spread over a wide area on the bank of a small tributory of Damodar. The tools are almost in a mint condition. Archaeologically speaking Biharinath which is about 8 to 10 miles away from Susunia and falls within the Susunia complex having a maximum preponderance of handaxes.

Emergent Regions :

It has been mentioned that the palaeolithic sites in West Bengal which have yielded tools types and technology in an associated manner are found to be distributed on the south-western part of the state which is an extension of Chotanagpur Plateau area. Despite this it is necessary to formulate a zonal pattern on the basis of clustering density. Each of the zone is characterised by its own identities in terms of geology and geographical traits.

The overlapping is met with between south-west Midnapore and north-west Purulia and north-west Bankura. The demarcation between two or more zones seems to be an enigma. To overcome this difficulty the plotting of sites was made in a map and the zones have been indicated interms of clustering density. This method has been found satisfactory and the result of which is the emergence of zonal divisions with six major components. They are Zone 'A', Zone 'B', Zone 'C', Zone 'D', Zone 'E' and Zone F.

It is assumed that these zones during the palaeolithic period was provided with considerable amount of diversity in terms of adoption Mechanism between man and environment and the expression of the same was made through culture. So, an intrinsic analysis of culture may lead to the understanding of the prevailing environment.

CHAPTER VI

Geo-Stratigraphy Related to Palaeolithic Industries

It is indeed a difficult task to bring about a synthesis between the problem related to geo-stratigraphy of palaeolithic industries in West Bengal. Because most of the workers on Stone Age culture in West Bengal have overlooked the importance of stratigraphy which is closely related to chronology. They over emphasised typology. As a matter of fact, the absence of stratigraphical column, from different Stone Age sites has made it practically impossible to work out a broad stratigraphic pattern. Despite this, maximum efforts have been made to accumulate reliable data from different sources in order to formulate geological stratigraphy on different areas. In utilising this methodology it has been found that the number of localities are six, and they are : (a) Suvarnarekha basin, (b) Belpahari region, (c) Kangsavati Valley including Kumari and Jam, (d) Matha forest region, (e) Susunia region, and (f) Biharinath region.

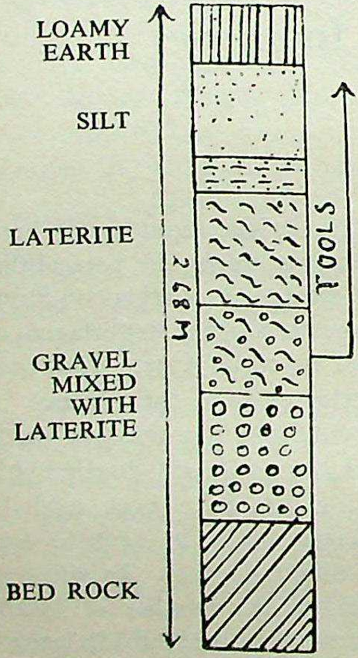
(a) Suvarnarekha basin

In this region some amount of works are carried out by Dr. Ghosh of the Department of Anthropology of Calcutta University during the year 1964-65 (*I.A.R.* 1964-65) and recovered tools from lateritic deposition above the bedrock and underline the silt deposition. Apart from this, the Directorate of Archaeology conducted extensive exploration in this region and recovered a number of palaeolithic tools.

Subarnarekha region

Section at Ghorapincha

This region was extensively explored by the Directorate of Archaeology. A trial trench was cut to ascertain the geo-stratigraphy of the region. Section exposed upto a depth of 2.68 metre reveals that immediately after the bedrock there is a thick deposition of gravels mixed with laterite. Above this there is a thick deposition of secondary or detrital laterite. This lateritic bed is considered to be the horizon of palaeolithic tools from this region. Above this there is a deposition of silt, the colour of which is reddish to yellowish. Above this there is a deposition of loamy earth which may be considered as the terminal point of pleistocene epoch.



Section at Ghorapincha

Section of Patanau

This region also reveals more or less the same geo-stratigraphic column to that of Ghorapincha. The bedrock which took a form of Kaolinised formation is about 2 metre high. Above the bedrock, there is a thick deposition of

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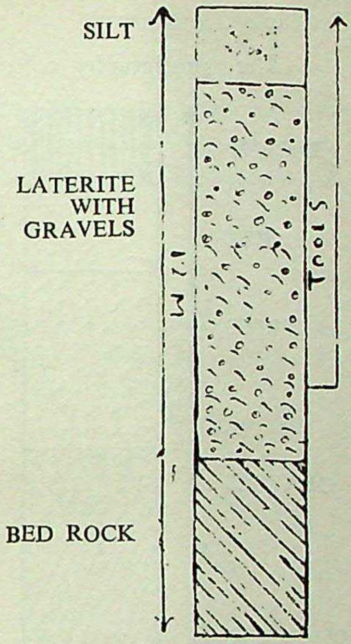
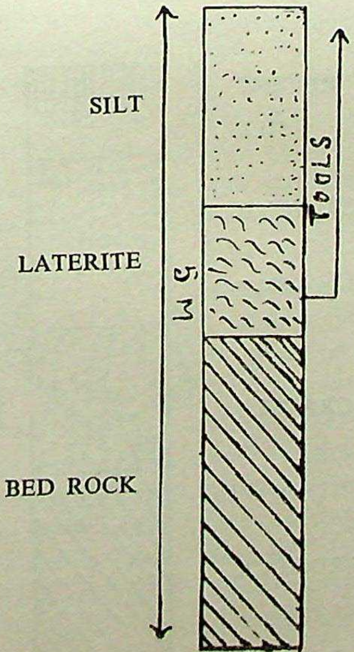
laterite which is often mixed with gravels. This deposition is about 9 metre thick. The palaeolithic artefacts came from this deposition. Above this there is a sandy silt deposition, and the colour of which is reddish to yellowish This bed is about one metre high.



Section at Patanau

Section at Kenduberia

This area also reveals the same stratigraphy in terms of geological formation. The total height of the section is about five metre. Here too above the bedrock there is a deposition of laterite often mixed with gravels. Above the lateritic bed there is a deposition of red silt. Pebble tools and handaxes have been recovered from the lateritic deposition.



Section at Kenduberia

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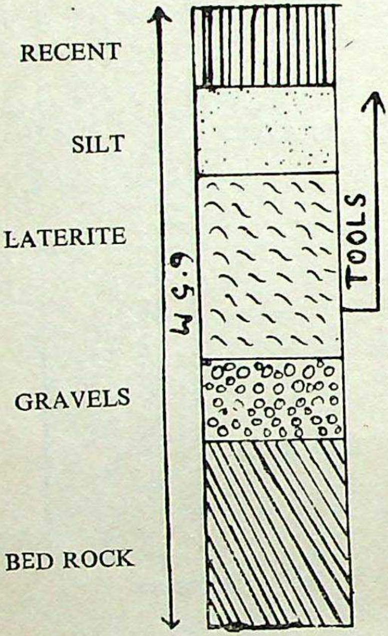
Section of Hatimara

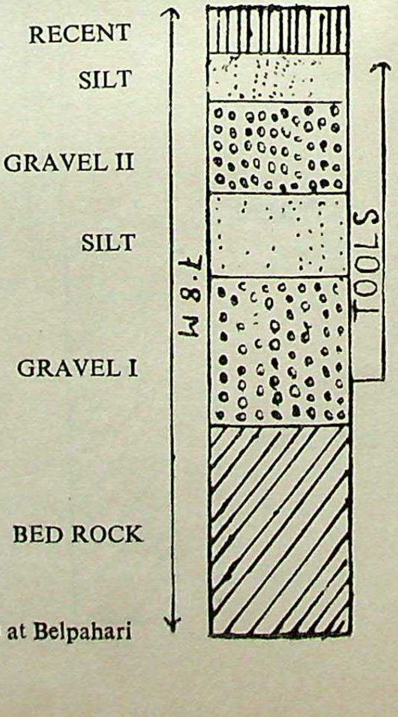
The stratigraphy column indicates a diverse climatic condition during the palaeolithic period. An organised exploration conducted by the Directorate of Archaeology in the year 1969, in the same region yielded large number of stone artefacts of Lower Palaeolithic period. The stratigraphy column observed by the Mr. P.C. Dasgupta reveals that the gravels are resting over the bedrock, and above the gravels there is a deposition of secondary laterite which is again overlain by a reddish silt deposition. Above the silt there is a recent deposition of loamy earth.



Section at Hatimara

(B) Belpahari Region

The geo-stratigraphy columns have been worked out by different scholars on Trafeni river, a tributary of Kangsavati. The present author observed a more or less similar stratigraphy exposed at a *nullah* close to the river Trafeni near Dhuliapur. There are two gravels and two silt depositions above the bedrock and the deposits are alternate in nature indicating a diverse climatic condition.



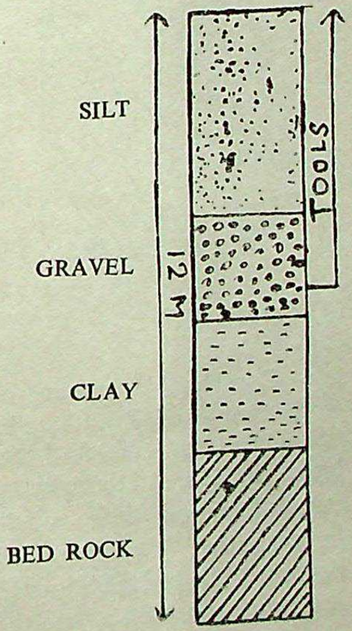
Section at Belpahari

(C) Kangsavati Valley :

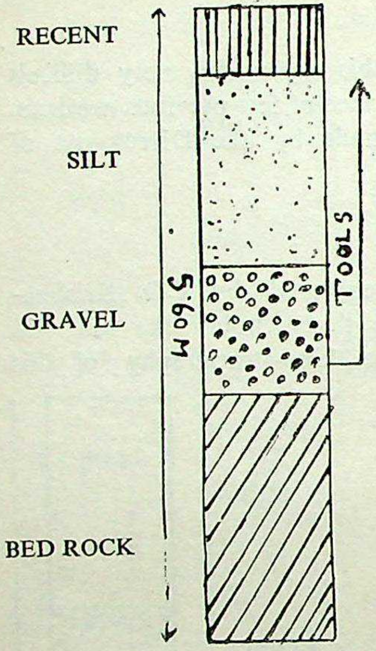
The Geo-stratigraphy of this region, it is very difficult to work out due to the ignorance of few previous workers. Despite this attempts were made by the Directorate of Archaeology in this regard.

Section at Kankradars :

This region was formally explored by V.D. Krishnaswami, but it is very unfortunate that scholar like him did not pay much attention to the Geo-stratigraphy of this region. Some amount of work was carried out later on by the Directorate of Archaeology in this region to ascertain the Geo-stratigraphy column of the region. Section exposed at Kangsavati reveals that immediately above the basalt foundation there is an accumulation of pinkish to whitish clay of a thickness of about 1.50 metre. Over the clay deposit there is a layer of cemented gravels which is often mixed with quartzite. This gravel layer is about one metre thick on the average. The gravel conglomerate that visualises the effects of a pluvial phenomenon in the pleistocene and the subsequent dry phases is the horizon of the Lower Palaeolithic artefacts. The gravel conglomerate is overlain by a reddish-silt which has taken a massive appearance at the southern bank of the river. This reddish silt deposition above the gravels is about 8 metre high. The silt deposition has formed two major terraces along the northern bank of Kangsavati. The surface of reddish silt is supposed to be the horizon of Upper Palaeolithic industry.



Section at Kankradara



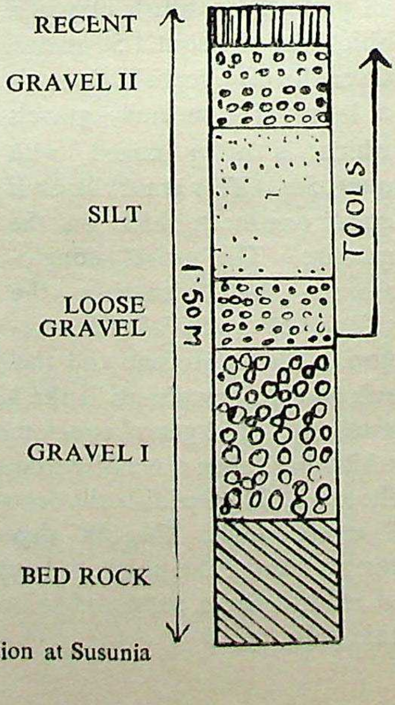
(*D*) *Matha Forest Region* :

The State Directorate of Archaeology had carried out regular field work in this region. But unfortunately they paid little attention to work-out the stratigraphy of this region. The importance of stratigraphy is not felt by many workers which is closely related to Palaeo-environment. The Geo-stratigraphy at Matha forest reveals that above the bed rock there is a deposition of gravel bed which is again covered by a silt bed. The silt deposition is covered by recent deposits.

Section at Matha Forest

(*E*) *Susunia Hills* :

Considerable amount of works were carried out here by the Directorate of Archaeology. The Geo-stratigraphy as revealed from their works indicate that there are six deposits. The bed rock is covered by a deposition of mottled clay. The clay bed is capped by a pebble bed. This in turn is covered by relatively thin gravel bed. The gravel bed is not hard and consolidated. Next comes the deposits of silt bed. This bed is compact and hard. The silt bed is again

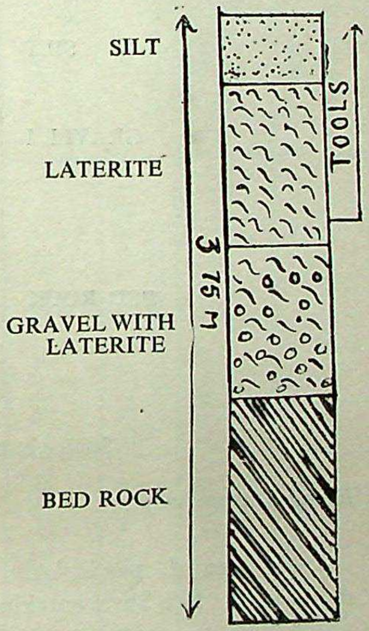


Section at Susunia

covered by a bed of gravels often mixed with sand and clay. At top there is to bed of recent origin. The thin clay beds including the final one of recent origin speaks of an arid and semi-arid climatic condition in this region during the palaeolithic period while the presence of three gravel beds indicate that the precipitation in the area was much higher during the period.

Section at Bankathi :

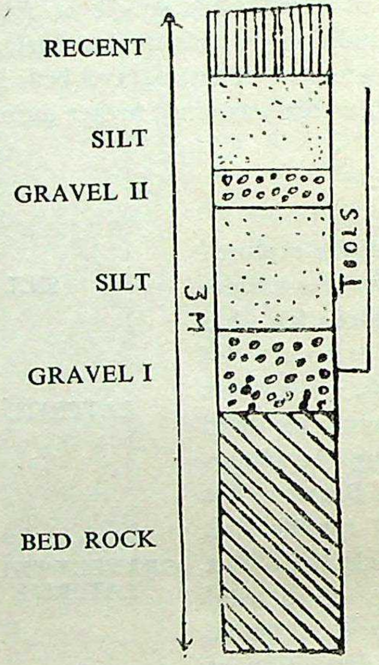
This region was explored by the Directorate of Archaeology. The exploration has yielded in the recovery of wood fossil tools. The tools consisting of handaxes and choppers recalling the Anyathian industry of Burma. The Section exposed reveals that above the bed rock there is a thick deposition of detrital laterite with gravels. Above this there is a deposition of Posolithic laterite, and above which there is a sandy silt deposition. Palaeolithic tools have been recovered from the detrital laterite bed.



Section at Bankati

(*F*) *Biharinath Hills* :

The Geo-stratigraphic column as observed by the author at a cliff section of a nullah near ghutingdanga reveals that there are alternate deposition of gravels and silts. Above the bed rock there is a deposition of gravel bed which in turn is capped by a bed of silt. The silt bed is covered again by a loose gravel bed. This in turn is covered by a silt bed which is again capped by recent deposits. The alternation was cyclic in nature but the intensity was varied interms of higher and lesser precipitation.



Section at Biharinath

Broad Stratigraphy :

In Bengal, particularly in the region under study, the major rivers like Suvarnarekha, Dwarakeswar and Kangsavati are found to contain an alternate deposition of gravels and silts indicating a climatic change of wet and dry phase during the pleistocene period, while in case of it's tributaries like Gandheswari, Silabati, Dulong and Tarafeni, the deposition of gravels and silts are sometime replaced by secondary laterite. This replacement of gravels and silts by secondary laterite is not noticeable at Tarafeni where the placement of pleistocene deposits are gravel and slit. The nature of deposition of secondary laterite is more or less same everywhere. But the thickness of deposition is variable at places and that too is mainly due to topography and specific local conditions. On the basis of depositions of both the rivers and it's tributaries an

TABLE SHOWING THE CORRELATION OF DEPOSITION OF DIFFERENT RIVERS OF WEST BENGAL ALONG WITH LITHIC INDUSTRIES

QUARTARNARY STAGES	SEDIMENTARY UNITS		INFERRED CLIMATE	INDUSTRIES
	TRIBUTARIES	MAJOR RIVERS		
HOLOCENE	RECENT DEPOSITS	RECENT DEPOSITS	RELATIVELY WET	MICROLITHS
UPPEP PLEISTOCENE	UPPER SILTY CLAY	UPPER SILTY CLAY	DRY CONDITION	UPPER PALAEOLITHIC
	DETRITAL LATERITE	UPPER LOOSE GRAVEL	WET CONDITION	MIDDLE PALAEOLITHIC
MIDDLE PLEISTOCENE	DETRITAL LATERITE	SILTY CLAY	DRY CONDITION	LOWER PALAEOLITHIC ABBE ACHEULIAN I II III
	DETRITAL LATERITE	LOWER GRAVEL CONGLOMERATE	WET CONDITION	
LOWER PLEISTOCENE	MOTTLED CLAY	MOTTLED CLAY	DRY CONDITION	? ?
	LATERITE MIXED WITH GRAVELS	? ?	WET CONDITION	? ?

Fig. 4

attempt may be made to correlate them (Fig. 4). In the major stream, the author observed the following sequence along with inferred climatic cycles.

At the major Rivers :

(6) *Recent deposition*	(Relatively wet condition)
5. *Upper silty clay*	(dry conditions)
4. *Upper loose gravel*	(wet ,,)
3. *Silty clay*	(dry ,,)
2. *Lower Gravel conglomerate*	(wet ,,)
1. *Mottled clay*	(dry ,,)

At the tributaries, the depositional sequence are :

6. *Recent deposition*	(Relatively wet condition).
5. *Upper silty clay*	(dry conditions)
4. *Secondary or detrilal laterite*	(wet ,,)
3. *Detrital laterite*	(dry ,,)
2. *Detrital laterite*	(wet ,,)
1. *Mottled clay*	(dry ,,)

In West Bengal, sometimes, the lower gravel conglomerate, silty clay and upper loose gravels are replaced by secondary or detrital laterite (Ghosh 1967). The Geo-stratigraphic position of the lithic industries from West Bengal are as follows :

(1) The Horizon Lower Palaeolithic industries in West Bengal is the lower gravel conglomerate of the main rivers or the secondary or detrital laterite of the tributaries. The Lower Palaeolithic industry continued for a considerable period of time. It may be a very difficult thing to ascertain the exact position where the Lower Palaeolithic

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ends and the Middle Palaeolithic starts. Because there is a good deal of overlapping. On the basis of *in situ* finds it may tentatively be assumed that the Lower Palaeolithic industry continued upto upper loose gravels.

(2) The stratigraphical position of Middle Palaeolithic industry in West Bengal is the junction of upper loose gravel and upper silty clay. The Middle Palaeolithic industry in West Bengal continued for a very short period of time.

(3) The Upper Palaeolithic industries of West Bengal starts from the middle of upper silty clay and terminates with the on set of Halocene period. The beginning of Upper Palaeolithic industry in West Bengal coincides with the emergence of modern man *(Homo sapiens sapiens)*.

From the above description, it may be concluded that there are similarities and dissimilarities in the stratigraphic sequence observed from six major regions. The dissimilarities are due to local topography, the composition of sediments and the fluvial characters by which the deposition is made. Out of six major regions, four has yielded alternate deposition of gravel and silts while in case of other two regions, the gravel beds are replaced by detrital laterite. The occurance of thick deposits of laterite imparts factural evidences of climatic changes. The basic type of deposits are two in number *viz*. gravel and silt. These two types are mostly found in alternate succession. At times, the number of deposits decreases or increases. The deposit of gravels in two different regions does not always indicate a similar climatic condition. It is to be found out why and how the deposits were made.

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CHAPTER VII

Raw Material, Techniques and Types

In case of Prehistoric time period, only the material culture in the form of stone tools have survived. When a type is produced out of raw material, the close relationship between the two can not be overruled. Because in the matter of relationship, there are two issue on raw materials (Datta 1979). One is the kind of raw material and the other is the form of raw material.

In case of the former, it includes the varieties of rocks like quartz, quartzite, jasper, chert, sandstone, wood fossil, etc. It is known that rocks are the combination of certain minerals which has a direct bearing on the physical property of the rocks. For the Convenience of fabrication and functional utilization, the early man preferred the hardness of rocks. It is also known that rocks with conchoidal fracture is the ideal material for making tools.

In case of the later, pebbles (Rice, 1954 : 297), in the strictest sense of the term cobbles (Lahee 1952 : 37), are the most suitable form. Instead of chunks or blocks of rocks, pebbles are provided with initial shape and form. The form of material may be pebble/core of flake. But as stated earlier, it is observed that pebbles with flat surface for stricking platform are the best suitable form of raw material. It is difficult to knap flakes from rounded pebbles which may be noticed on many tools where the butt end is left unworked and the cortical surface is retained. In case of bifacially worked tools, the flatness on both the dorsal and ventral sides of the pebble are required for getting the desired shape.

In India with regards to the palaeolithic industries, the pebble and core tools are labelled on the basis of pebbly cortex. When a tool contains pebbly surface, it is called pebble tool and in the same way when a tool is devoid of the same, it is called core tool. But in reality there is no justification for such classification on the basis of pebble cortex. For example a tool before it's initial flaking, might have contained pebbly cortex but after final flaking the pebble cortex may be removed and the presence of which cannot be ruled out. So the differences between a pebble tool or a core tool does not make sense. It may be noted here in this connection that the terminology like pebble tool/industry/culture is not always a very justified one (Clark 1962 ; Ghosh 1975). It may be relevant in this context to note that such tools may be designated as tools made on pebble or core instead of pebble or core tool.

In West Bengal, the raw material in most of the cases is either quartz or quartzite, The present author had the opportunity (courtsey of Mr. P.C. Dasgupta) to examine the huge collection from both Susunia and Suvarnarekha and observed that more than 80% of Lower Palaeolithic tools are made out of quartzite. Quartzite in the form of pebbles are found abundantly along the river banks and foothills. The hominids who lived in this part of India during the Pleistocene epoch, preferred this type of materials for making tools. They have achieved complete control over the technology in making tools out of quartzite. Because quartzite is considered as the hardest stone next to diamond.

TECHNIQUES

The technology is one of the major qualities of Early Man that distinguished him from other primates. So, the concept of technology gave rise to major form of culture. Culture cannot be conceived without the material manifestation of tools and tools cannot be produced without technology (Datta 1979).

It may be assumed that at the initial stage, there was no technology, and in the absence of any technology, the ancestor of Early Man might have used tool-like pieces which served the purpose of certain function (Ackley 1951; Ghosh 1971). Simons and Pilbeams (1965) also suggested that *Ramapithecus* might have used *ad hoc* tools. But the difficulty in identifying the same is immense. It may be a logical pretension that before the advent of technology that manifested in the making of true tools, selected pieces of stone/bone and other perishable materials were used by the ancestor of Early Man for both defensive and offensive purposes.

Free Flaking :

The first attempt to strike a flake from a large pebble/block was perhaps a hall mark in the beginning of technology and the production of tools.

In case of free flaking, flakes can be removed either by striking the block with a hammerstone or hitting the block on a static anvil. Two types of technology are known as stone hammer techniques and anvil technique. At the initial stage it was simply the blow and very little amount of precision was required for this technique and as a matter of fact both the techniques are taken together and clustered as free flaking techniques. The evidences of application of both the techniques are found on many tool types *viz.*, choppers, flakes and debitage materials. The most significant evidence is chopper on which this technique was applied. On the basis of the initial application of this technique it may be assumed that choppers are the earliest tool types found in West Bengal.

Application of this technique in a slightly different way, that is in the orientation of striking flakes, might have resulted in the variation of types, such as handaxes and choppers.

The free flaking technique was continued for a considerable period of time. The manifestation of this free flaking technique is found on early choppers and handaxes belonging to Abbevillion type. Though the technology continued for a long period of time, yet it was not static. During this long period of time it underwent a process of change and much precision was achieved by this time. This is evident from the fact that when a new technique was introduced, this former technique was not discarded altogether. As a matter of fact, the free flaking technique retained for primary shaping the blocks from which the tools are to be produced. The introduction of a new technique, was an indication of functional change of tool technology. In case of later free flaking technology, some amount of controlling the movement of force in striking flakes was achieved which is evident from the enlargement of working surface on tools.

Controlled technique :

We do not know exactly when and how this new technology was introduced in making tools. But it may be assumed that this new technology was not introduced all of a sudden, rather it was a gradual process of development of the former technology. The necessity for refinement of tools made it possible. The introduction of this technique is evident from the tools of later phases. The tools made by this technique is provided with additional flake scars which are small or shallow and completely worked on both the surfaces in majority of the cases. With control over the movement of force, the tools produced are symmetrical, neater and having a thinner cross-section. This supermacy of technology over flakings are supposed to have been achieved by the introduction of cylinder hammer and the hand hammer (Bordes 1968) techniques. The Acheulian phase of Lower Palaeolithic period is marked with the introduction of this new technology.

It is suggested that technological development might have something to do with biological changes. This biological changes are noticed in brain and hands. In case of the former, it understood and visualized the necessity for better technology. Accordingly the input ideas of the former and their output responses were executed by the latter. The idea of better working area, symmetry in shape and improved functional aspects were implemented by hands or through labour or skill. This technological development as manifested in the improvement of tools types, are a step forward towards progression (Fig. 5).

TYPOLOGY

Typology comprises a number of types and each type is seperated from other on the basis of certain characteristics. In this regard the morphology or shape is the prime criterion by which the identification may be made. The shape of any tool is determined by certain other characters and they are : the form of raw material and the technology. The initial tool type is governed by the initial form of raw material. A narrow and elongated pebble cannot be shaped into a cleaver. Similarly a small rectangular pebble cannot be considered for knapping a handaxe. Likewise a thin and flat pebble cannot be knapped into a chopper. So, there is some amount of correlation between the selection of initial materials and the final tool types. This transformation from one to another form is made possible with the help of technology. The shape of a tool is also governed by the technology. A highly developed Acheulian handaxe cannot be achieved by free flaking technique. This shape can only be achieved with the help of controlled flaking technique.

In case of the Lower Palaeolithic industry in West Bengal four major types have been recognised and they are : choppers, handaxes, cleavers and scrapers. All the above types are either made on free flaking or through the controlled flaking. Despite this, some amount of differences are present in identifying the sub-types. For example the distinction between chopper and scraper are misnomer. The only distinction between these two different types, is one of gross size (Movius 1948) and that too

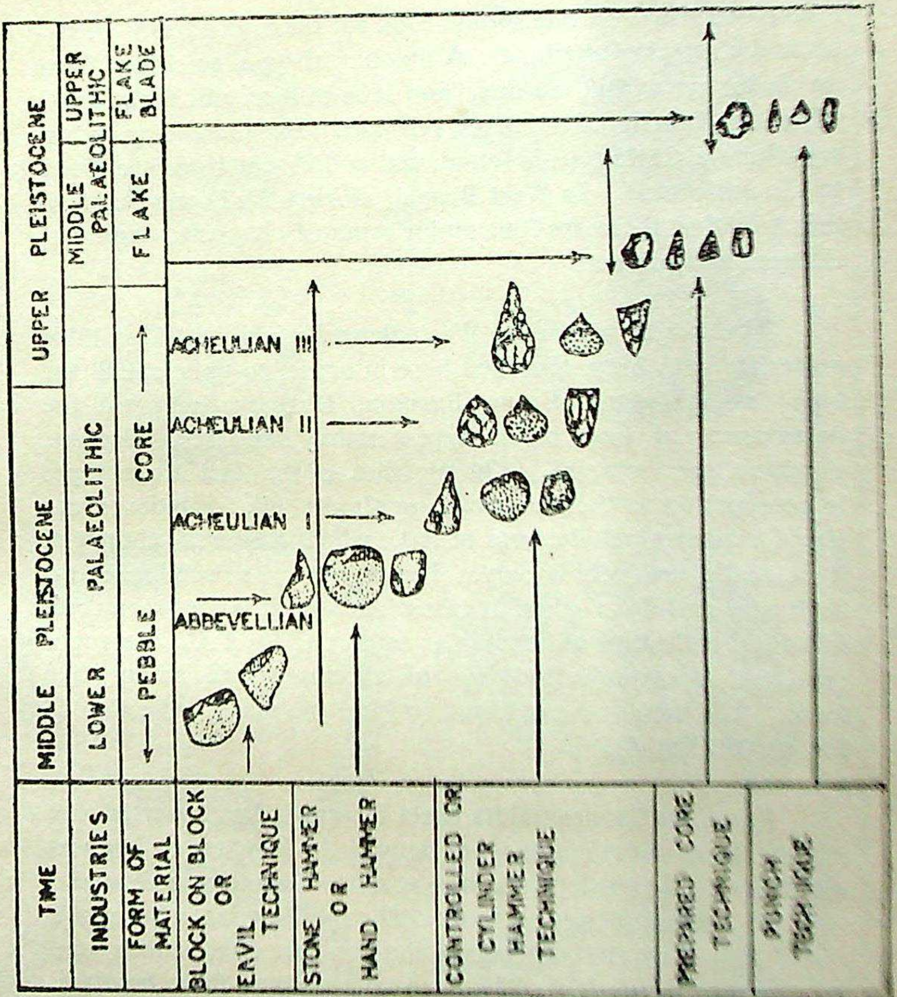
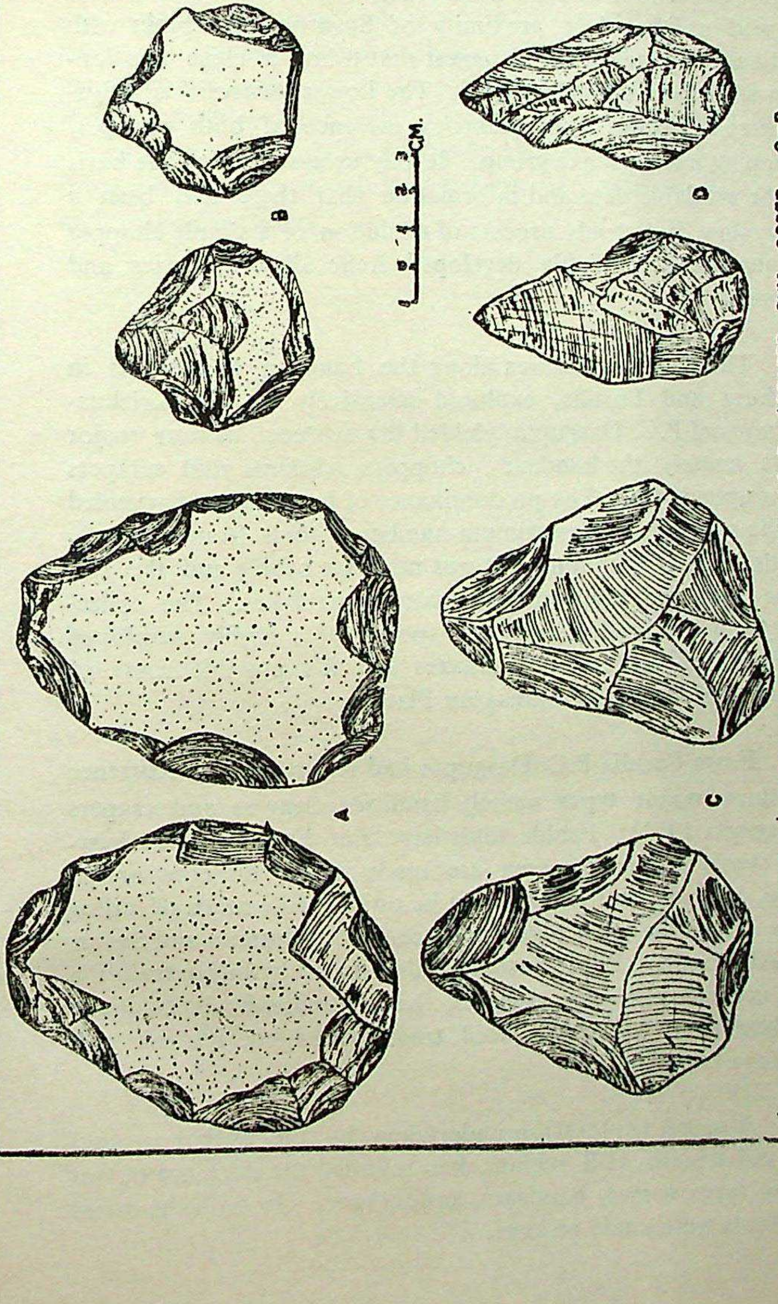

TIME
MIDDLE PLEISTOCENE
UPPER
UPPER PLEISTOCENE
INDUSTRIES
LOWER PALAEOLITHIC
MIDDLE PALAEOLITHIC
UPPER PALAEOLITHIC
FORM OF MATERIAL
PEBBLE
CORE
FLAKE
FLAKE BLADE
ABBEVELLIAN
ACHEULIAN I
ACHEULIAN II
ACHEULIAN III
BLOCK ON BLOCK OR EAVIL TECHNIQUE
STONE HAMMER OR HAND HAMMER
CONTROLLED OR CYLINDER HAMMER TECHNIQUE
PREPARED CORE TECHNIQUE
PUNCH TECHNIQUE

Fig. 5

is not proper and meaningful. In case of handaxes, the ovaloid and oval does not make any basic difference. Likewise triangular, sub-triangular and elongated triangular and pear and elongated pear mean little differences. Cleavers are divided into several ways on the basis of cutting edge or lateral margin or butt end. The main difficulty in this univariable classification is the overlapping. For example a straight edged cleaver might have "U" butt or "V" butt again 'V' butt cleavers might have convex or concave cutting edge. To get rid of this ambigious situation one should look for the multivariate analysis and clustering attributes. A number of types or classes form an industry within an area and even in a specific time period where the functional needs are relevant. But there is no industry where a single type is found, rather different types are found to be associated. In West Bengal, during the Lower Palaeolithic industry, there are four major types of choppers, handaxes, cleavers and scrapers.

The major areas in West Bengal yielding Palaeolithic materials have been described here in order to understand the type assemblages. From Susunia, Dasgupta reported the occurrence of four major types mainly handaxes, cleavers, choppers and scrapers. The presence of the last three types in comparison to the handaxes, are almost nil. Handaxes are found made on pebble, core or flake while in case of choppers, it is made on pebble only. The cleavers are found made on both core and flake while in case of scraper it is found on core. The total collection of Susunia as reported by P.C. Dasgupta (personal communication) is one thousand and seventy one tools. The handaxes are found to form the major collection of the region (Fig. 6).

From the Suvarnarekha basin Dasgupta has reported the occurrence of three major types namely the handaxes, choppers and cleavers. The total collection consist of about one thousand and six hundred twenty tools. Though handaxes form the major collection, the presence of choppers are conspicuous and are about four hundred. The cleavers are about three hundred. The handaxes are found both on pebble and core while the choppers are made on pebble only and in maximum cases it is unifacial. In case of cleavers, it is found on both cores and flakes. The cleavers with both straight cutting edge and oblique cutting edge were found. In case of the later was mostly 'U' shaped having notches on the edges. The giant handaxes are conspicuous by their presence in the Suvarnarekha basin. In Susunia the occurrence of chopper is almost nil but in case of Suvarnarekha the presence of choppers is very significant and in fact it forms the second



PALAEOLITHIC TOOLS FROM SUBUNIA A: HANDAXE ON PEBBLE B: SCRAPER CUM BORER. C-D HANDAXES ON FLAKE

Fig. 6

largest collection. On the basis of large number of pebble tools as well as the close proximity of Suvarnarekha basin with Kuliana, one may tend to suggest that it has a close relationship with the Kuliana, complex. The Lower Palaeolithic industry here illustrates a simultaneous presence of both chopper/chopping and handaxe group. It may be assumed on the basis of the available data and information that there had been a very slow but steady process of evolution of a simple chopper on quartzite into highly developed Acheculian handaxes and cleavers.

The Kankradara area along the bank of Kangsavati in Bankura and Purulia, explored extensively by V.D. Krishnaswamy and P.C. Dasgupta, yielded the existence of four major types namely the handaxes, choppers, cleavers and scrapers (Dasgupta 1971). The predominance of handaxes, are revealed by the occurrence of maximum number of tools from the area. While in case of choppers, it was made on pebble and the rest three types were made either on core or on flakes. The collection from Kankradara not only speaks of a highly developed symmetrical Acheulian handaxes but it's possible route of diffusion along the Chotanagpur Plateau.

From Purulia P.C. Dasgupta had reported the occurrence of three major types namely handaxes, cleavers, and scrapers (Dasgupta 1971). Pebble tools have not been reported here. The tools from this area are made either on core or on flake. Purulia and Kankradara lie on the cross-roads of diffusion from the great palaeolithic centres of Susunia and Suvarnarekha basin While Susunia is dominated by biface tradition that is handaxe/cleaver complex, the Suvarnarekha is evidently perdominated by pebble tool tradition having it's link with Kuliana complex.

A recent exploration undertaken by the author around the Biharinath Hill region, has revealed the existence of two major types namely handaxes, and scrapers. In both the cases the tools were made on core.

From Tarafeni basin in Belpahari region all the major four types namely handaxes, cleavers, choppers and scrapers have been reported by A.K. Ghosh (1962). In this area the choppers are found made on pebble while the handaxes are made on both core and flake. Cleavers are made on flake while the scrapers were made on both core and flake. The collection from this area also reveals the existence of unifacial handaxes and cleavers on flake.

CHAPTER VIII

Assembleges, Industries and Culture Zones

TYPE ASSEMBLEGES

A number of types occur within the Lower Palaeolithic industry in West Bengal. It may so happen that there are more types which are not still recognised. This speculation may be substantiated by the recent discovery of new types belonging to Lower Palaeolithic from East Africa (Leakey, 1967) and also from Indonesia (Koenigswald and Ghosh, 1973). This new type includes points, burias, etc. In India this is yet to be identified from Geo-stratigraphic coloumn.

From West Bengal all the major five tool types have been reported and they are : choppers, handaxes, cleavers, scrapers and discoids. All these types are almost present in the six major locality. If we consider that there was only one type assemblege, one industry and a single culture during the Palaeolithic period in West Bengal, then it becomes much more clear and perhaps it does not require to evaluate the different industrial component within Palaeolithic period. But in reality, we find a good deal of variation of different tool types. A close analysis of both the sites and localities will reveal that there are unity and diversity in regards to the presence of tool types. A statistical analysis in terms of percentage distribution will reveal a marked variation of the ratio of the tool types.

Primarily all the sites have been considered and the consideration was made on the basis of occurrence of major tool types. Sites like Bankati and Lalgarh have been excluded from the present work though it has yielded fossils wood tools. But the number of tools are very meagre numbering about four to five. Percentage of each tool type was calculated by taking into account the total number of tools recovered from a particular locality. While doing so, maximum care was taken to avoid the minimum error. The clustering of sites are lumped together to bring to six major localities and they are : 1. Susunia; 2. Biharinath; 3. Purulia; 4. Kankradar; 5. Tarafeni; and 6. Suvarnarekha. The frequency of each tool types in the six major localities, will give an idea of the trend of distribution of Lower Palaeolithic tools in West Bengal. A brief and comprehensive analysis of different tool type assembleges in six major localities, will finally lead to the emergence of different culture zones.

1. Susunia

This area is mainly drained by the river Gandheswari and it's many streams and nullahs. Innumerable Lower Palaeolithic tools of both. Abbevelian and Acheulian type of handaxes from this region around Susunia hill comprising several varieties *viz.* ovoidal, lanceolates, pointed ovates and cordates of quartz and quartzite have been reported. The presence of choppers, and cleavers are almost nil. The study of Lower Palaeolithic materials from the eroded and rocky land surface around Susunia will reveal a high frequency in the occurrence of handaxes that appears characteristic before the rarity of cleavers and choppers. One may rather find it difficult to explain the prepondarance of handaxes here. This area may be included in the Chotanagpur Plateau complex where handaxes are the dominating tool type during the Lower Palaeolithic age. Due to forest ecology, the people of that area preferred a defensive weapon in their struggle for survival. . Altogether thirty-nine sites have been considered within this area. From the computed report, it reveals that the handaxes possess the highest percentage (98%) of all the localities and of all the types. The percentage of both the cleavers and choppers are very feeble being (1% and 1%) respectively. The low percentage of choppers and cleavers are very much conspicuous, but at the some time very significant.

2. Biharinath

This area comprising Biharinath hill is drained by a small tributary of the main river Damodar. The author extensively explored this area and discovered a number of Lower Palaeolithic tools amidst silt and gravels. Out of four, three major tool types namely handaxes, cleavers and scrapers and two picks have been recovered from here. The percentage of distribution shows a high frequency of handaxes ((85%). The cleavers are (3%). The prepondarant area of handaxes are mainly due to its close proximity with Susunia. Choppers are absent here.

3. Purulia

This area was explored by V. D. Krishnaswami and following him, regular field works initiated by the Directorate of Archaeology along the banks of Kumari and Jam, has yielded a number of Lower Palaeolithic artefacts. The main tool-bearing sites of this area are Hanumati, Amruhasa, Nangsai, and Bandu. The percentage of handaxes are slightly more than half of the total collection (64%) and next comes cleavers (20%), while the presence of choppers are nil.

4. Kankaradara

The frequency of handaxes again gives a sharp rise (81%) while in case of cleavers and choppers, they are (5%) and (6%) respectively. The sharp rise of frequency line may be explained in terms of it's close proximity with Susunia area.

5. Tarafeni

This area was explored by a number of scholars including the author himself. All the major four types namely handaxe, cleaver, chopper and scraper have been found from here. The percentage of handaxe again drops and it is more than half of the total collection (62%). The percentage of cleavers and choppers shows an increase and they are (19%) and (13%) respectively. The frequency of cleavers remains mearly constant as compared with Purulia area. But the total absence of choppers there is very much conspicuous.

6. Suvarnarekha

A number of scholars have worked here and they have discovered all the four major tool types namely handaxes, cleavers, choppers and scrapers from here. But the report compiled here are based on the field work conducted by the Directorate of Archaeology. This is one of the most sensitive areas of Lower Palaeolithic culture for more than one reason. Firstly due to its close proximately with Kuliana complex of Orissa. Secondly this area has yielded the maximum number of choppers (25%) of a single type. Thirdly this area has so far yielded the largest number of stone artefacts from West Bengal. The percentage of handaxes further drops and it is little over more than half (57%). The precentage of cleavers, more or less, remains constant (18%) while the percentage of choppers are on the increase. It is (25%). It is really interesting to note that as one proceeds from the north to south the percentage of choppers is gradually increasing.

An over view of the Assembleges

From the foregoing discussion of the three major tool types in six localities, there are some interesting results. All the three major types namely the handaxes, cleavers and choppers are found to be present in all most all the six major localities with variable degrees and percentages.

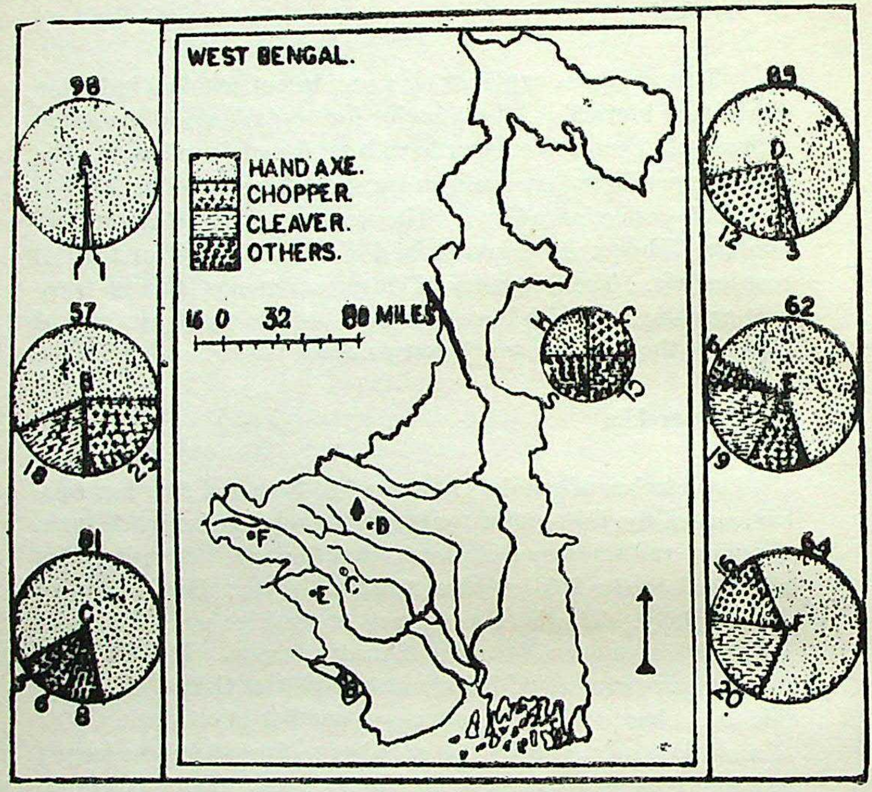

WEST BENGAL.
HAND AXE.
CHOPPER.
CLEAVER.
OTHERS.
16 0 32 80 MILES
98
A
57
B
18
25
81
C
6
8
85
D
12
3
62
E
19
64
F
20
H
C
CL
O

Fig. 7
Map showing the percentile distribution of major types from six localities

The handaxes are present in all the six localities. It is always more than half and sometimes it is nearly the cent percent. The maximum percentage of handaxe 98% is found in Susunia locality and the lowest being 57% found in Suvarnarekha area. The average of handaxe is about 74%.

The cleavers are found present in all the six localities. But they are never more than 20%. The range of variation is between 20% to 1%. The average of cleaver is about 11%.

Out of six localities, the choppers are present in four localities. They are totally absent in Purulia and Biharinath areas. The range of variation of chopper is between 25% to 1 % and the average is about 11% (Fig. 7).

By culture we mean what a particular group of people within a particular period of time thinks, believes and practices. This form of components, of culture may be material and ideological. In case of palaeolithic time period, only the material traits in the form of stone artefacts survive. Within the Lower Palaeolithic period there are a number of industrial components. This variability of industrial units within the Lower Palaeolithic phase may be explained in terms of space and tool type assembleges. The variability of tool type assembleges are found to occur in the six major localities. From the analysis of the foregoing six localities, it was found that there is a good deal of variation in the distribution and frequency of three major tool types. This variability in distribution and frequency of stone tools during the Lower Palaeolithic period was imposed on men by the negative parts of environment. To overcome these difficulties the Early Man expressed the same in term of material manifestations. The specific type of stone tool was made to cope with specific needs. The number of types and the frequency of the same are dependent on the nature of necessities. The analysis of different tool types and the frequency of the same in different areas will lead to the demarcation of specific area within the Lower Palaeolithic culture. In the present work this methodology is followed to find out the different industrial zones within the Lower Palaeolithic culture.

INDUSTRIAL REGIONS

The six major localities have been cut short to five regions and they are :

Region-A : The localities Susunia and Biharinath have been marged into a single region and is known as Susunia region. From the compilation of data of both the localities, it is found that in this region, handaxes, cleavers and choppers are 91%, 2% and 1% respectively. There is a slight drop in the percentage of handaxe due to the inclusion of Biharinath Locality in this region.

The percentage and frequency of each tool type from the other four regions remain the same as there is no major inclusion or exclusion of any locality. And the four localities have been converted into four regions and as such there is no change in the percentage distribution of tool types.

An integrated and unified analysis of three major tool types from the five major regions show that the handaxes is the highest in north-western (91%) (North Bankura) part of West Bengal. It drops to 81% at south central (South Bankura). It further drops to 64% in Purulia. As one further proceeds east, it again drops at Tarafeni and Suvarnarekha (Midnapore) to 62% and 57% respectively (Fig. 8).

In case of cleavers, the maximum concentration is found to occur in Purulia region where it is 20%. As one proceeds from Purulia to Suvarnarekha via Tarafeni region, the percentage is gradually decreasing. They are 19% and 18% respectively while in case of Kankaradara region it is 5% and in case of Susunia region it is only 2% (Fig. 8).

In comparison with handaxe and cleaver, the range of variation in case of chopper is the maximum. It is about 25% to 0%. The highest concentration of chopper is in Suvarnarekha region where it is 25%. The percentage of chopper drops at Tarafeni region where it is only 13% and at Kankaradara it is only 6% and at Susunia it sharply drops to 1% and it is almost nil in Purulia region.

All the three types have been taken together in each region (Fig. 8) which indicate a comparative evaluation. This is particularly useful for understanding the differences in the industrial complexes through the proportion of types in the respective assembleges. The differences in type and their properties reveal the differential industrial complexes. This differential industrial complexes are mainly due to the needs on the one hand and the functions as well the regional environment on the other.

On the basis of the above data and analysis it may be inferred that during the Lower Palaeolithic period, West Bengal was provided with some amount of unity. The difference in the

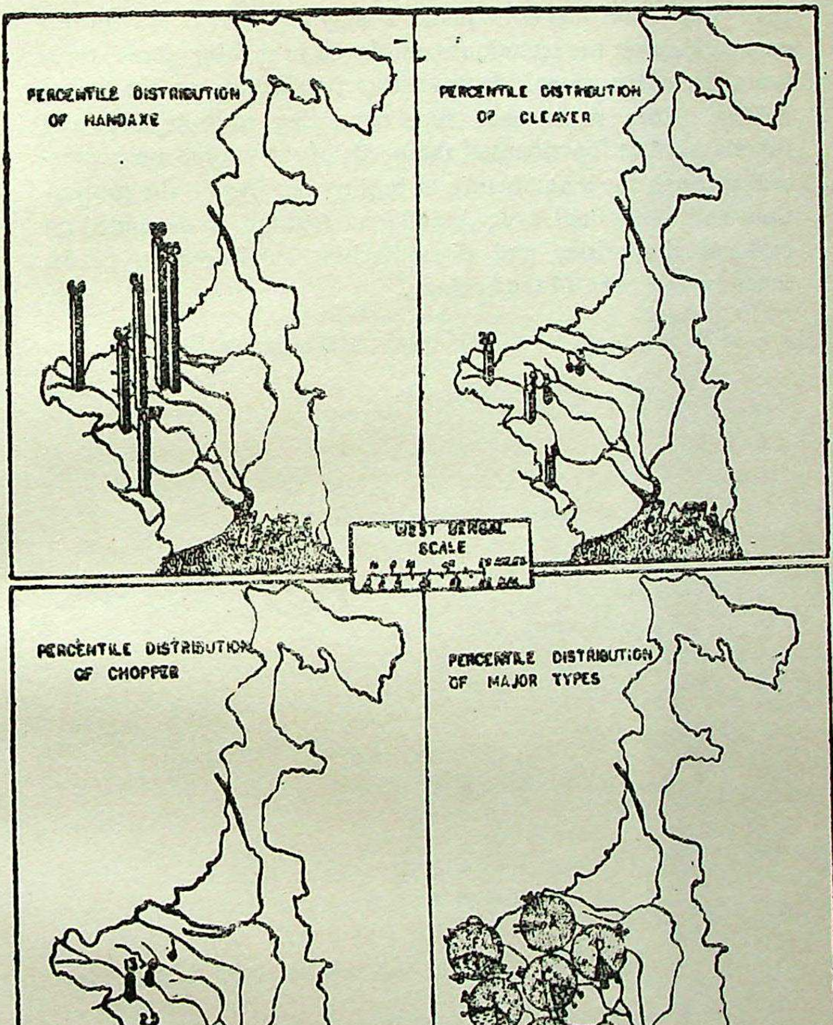

PERCENTILE DISTRIBUTION OF HANDAXE
PERCENTILE DISTRIBUTION OF CLEAVER
WEST BENGAL
SCALE
PERCENTILE DISTRIBUTION OF CHOPPER
PERCENTILE DISTRIBUTION OF MAJOR TYPES
20

Fig. 8

eco-system in different regions are reflected through the pattern of tool assembleges. The makers of Lower Palaeolithic culture made three major tool types. But the number of individual tool type and their proportion was not equal. It may be recalled here in this connection that the techniques employed in making these three types were the same. It was either free flaking or controlled flaking. They made each type according to their needs and functions. The function and the needs of the people are expressed through the manufacture of tool types. Again the proportion and individual type indifferent regions is depended on regional similarities and dissimilarities, environment, needs, function and over all the ecology.

CHAPTER IX

Dimensions of Space and Time

DIMENSION OF SPACE

All the major types are present in the five major regions. The types are handaxes, cleavers and choppers. Besides this other types like scraper, discoids and picks were also found but they have been excluded due to their incompatiable distribution.

ISO-TYPE DISTRIBUTION

The iso-type distribution of each type in term of diffusion mechanism has been taken into consideration.

Handaxes (iso-type distribution) :

Handaxes having the maximum percentage coverage in all the five region of West Bengal are the most dominant tool type during Lower Palaeolithic period. The most significant point to note in this connection is that this single type has the maximum occurrence in term of percentage ratio with other types. The iso-type line shows that it has the maximum concentration around Susunia region. The intermediate line goes through Tarafeni and Purulia region. The iso-type line further drops in the south at Suvarnarekha region where it is about 57% (Fig. 9).

From the iso-type distribution, it may be assumed that in West Bengal the maximum concentration of handaxes are found to occur in Bankura district. This may be explained in term of it's close proximity with the handaxe tradition of Chotanagpur plateau. The focal area of handaxe tradition was perhaps present in eastern and western region of India (Datta 1979). It may recalled here in this connection that Suvarnarekha region where the concentration of handaxes are less, is the eastern most extension of handaxe tradition in India.

Iso-type distribution of cleaver

The iso-type distribution of cleaver shows that the maximum concentration of cleaver is found around Purulia region where it is about 20%. The iso-type line of cleaver (Fig. 9) shows a movement from west to east. In the north around Susunia region the iso-type line ends with only 2%. The cleaver always succeeds the chopper and handaxes. This is really interesting to note that in Susunia region the handaxes from about 98% of the total collection, where as the cleavers are almost nil by their conspicuous absence which is very much contradictory to the present theory. The absence of cleavers are real significance, and the reason is to be searched for. It is an integral part of handaxe tradition. Purulia may be explained as the focal area of cleavers in West Bengal in term of diffusion mechanism. The iso-type line of cleavers having maximum percentage distribution maintains more or less a uniformity through Purulia, Tarafeni and Suvarnarekha regions where the distribution ratio shows no major variation.

Iso-type distribution of chopper

In West Bengal, the Suvarnarekha region has the highest concentration of choppers. The iso-type line (Fig. 9) shows a decreasing tendency of this type from east to west. The range of variation of this type is between 25% to 1%. On the basis of iso-type distribution of choppers in West Bengal, it may be contended that this type might have originated around Suvarnarekha region and the diffusion of this type was towards south-west. It may be recalled here in this connection that this type might have had some connection with South East Asia where the chopper/chopping tradition was so prominant. It may be noted hare that this type is completely absent in Purulia and at Susunia it is only 1% of the total collection pointing to the fact that the uneven distribution of choppers in West Bengal mainly due to regional dissimalirity in the form of environment, ecology and other needs and necessities.

Integrated iso-type distribution

All the three major types namely handaxe, cleaver and chopper are found in West Bengal in a mixed way in the form of an assemblege. The super-imposition of iso-type lines of the three major types (Fig. 9) will bring about a cumulative result of interactions between the types. It shows that the central part of south west Bengal has the maximum overlapping. The superimposition of iso-type distribution shows that the Susunia, Purulia and Suvarnarekha are the focal areas of handaxe, cleavers and choppers respectively. The map shows that Kankaradara and Tarafeni regions served as common platform for the movement of different tradition, in east-west, west-east and north-south directions.

The zonation of different tradition has an important bearing on culture as culture is the cumulative effort different tradition during the dim past. The distribution pattern of diffusion mechanism in terms of spatial covarage as shown in the map (Fig. 9) will lead to certain interesting conclusion. First, it is clear from the iso-tyye distribution of three major types that the handaxe during the Lower Palaeolithic period was the most basic type in West Bengal. Secondly, in case of chopper and cleaver, it had two seperate focal areas indicating to different environment.

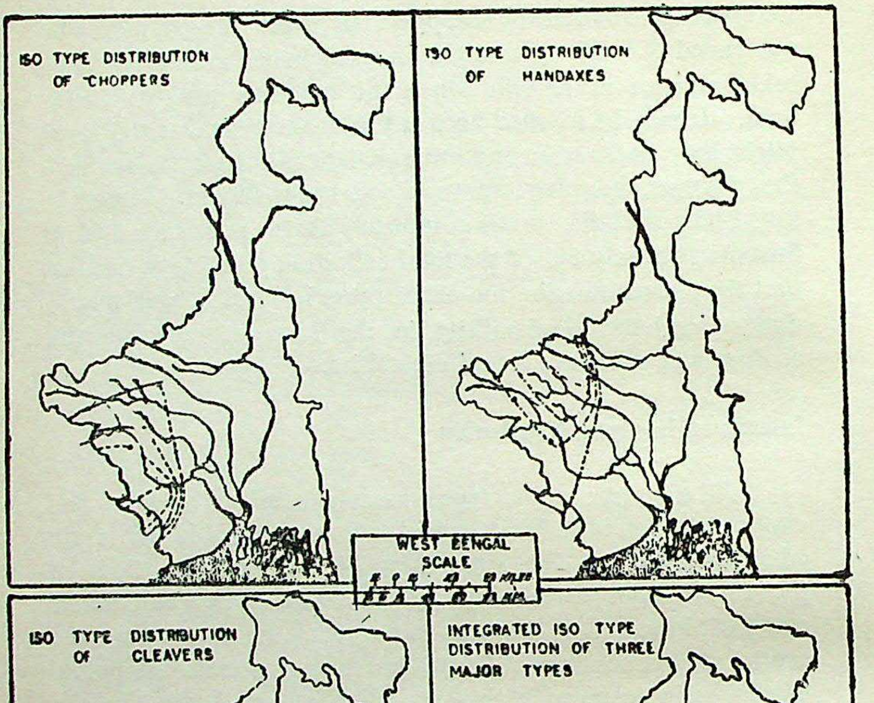

ISO TYPE DISTRIBUTION OF CHOPPERS
ISO TYPE DISTRIBUTION OF HANDAXES
WEST BENGAL
SCALE
40
MILES
KMS
ISO TYPE DISTRIBUTION OF CLEAVERS
INTEGRATED ISO TYPE DISTRIBUTION OF THREE MAJOR TYPES

Fig. 9

DIMENSION OF TIME

Without the dimension of time no industry or assemblege can be placed in the chronological scale which is very much important for understanding the culture as well as the development of different traits within the culture. In the chronological perspective there are two methods in terms of dating. One is related to absolute dating and the other is relative dating. Absolute datings are generally made by Radiocarbon method, Thermoluminesence methods, Potasium Argon, and Palaeomagnetic methods. The maximum range of Radiocarbon method is about 45,000 years, but the Lower Palaeolithic industry is supposed to be much more earlier than that. The application of Thermoluminescene and Potasium Argon methods have not yet been done in India. The method of Palaeomagnetic technique has been applied in few cases in India but the result of the same is yet to assessed. In fact, Indian prehistory is not placed on firm chronological yardstick in terms of absolute dataings which is very important to understand the changes in different aspects within an industry.

In the absence of any absolute datings from West Bengal, we can take the help of other method which is related to relative dating. The relative dating is primarily concerned with the geological stratigraphy, along with typology and technology. Difficulties are also there in case of geological stratigraphy. In West Bengal the geological stratigraphy in term of clustic sediments along the river banks are neither uniform nor it is properly attended to by the workers who worked on this part of India. Due to lack of information and data from West Bengal, it is, very difficult to place it's Palaeolithic culture on a firm chronological frame work. But despite this, attempts are made in terms of checking and cross checking stratigraphy from different parts in Bengal to minimise the error.

Suvarnarekha region

All the four major types *viz*. handaxe, cleaver, chopper and scraper have been found from here. The laterite mixed with gravels above the gravel bed is supposed to be the horizon of the Lower Palaeolithic tools and continued upto the lower limit of red silt which has been identified and correlated with Baltora formation of Lale Pliestocene (Sashtri 1976). Here the choppers and handaxes are found to occur simultaneously and cleaver came later. It may be recalled here in this connection that a fossils of *Homo-Sapien Sapien* found from Lalgarh at Sijua, not very far from here, has been tentatively dated as belonging to 10,000 B.P. by Geographical Survey of India.

Tarafeni Region

Here the earliest evidences are both choppers and handaxes. The gravels bed above the bed rock is supposed to be the lower limit of Lower Palaeolithic artefacts from this area. After a long continuity, the choppers disappeared and the handaxes along with cleavers continued for a long time. It may be recalled here in this connection that an unconfirmed analysis of samples from Tarafeni region gave a date of 0.7 million years B.P. which means 70,000 years to the gravel layer yielding Lower Palaeolithic tools in the region. The dating was done by Palaeomagnetic method, conducted in Russia through the courtsy of Dr. Asoke Ghosh of Anthropology Department Calcutta University.

Kankaradara Regions

The gravel conglomerate bed of Kankradara seems to have been the horizon of Lower Palaeolithic artefacts. Here, both the handaxes and choppers are found to appear simultaneously. Cleaver came later and continued for a long period of time.

Purulia Region

The geo-stratigraphy of this region is not properly worked out. The gravel bed above the bed rock is supposed to have been the lower limit of Lower Palaeolithic artefacts of this area. Handaxe is found to appear at the earliest stage in this area as the chopper is totally absent here. The cleaver came later and continued along with handaxe for a long period of time.

Susunia Region

In this region the handaxes and choppers are found to appear simultaneously. Though the presence of the later in this region is very negligible. This is mainly due to the lack of total absence of the type or proper identification of the same. The gravel bed No. 1 is supposed to have been the horizon of Early Stone age. Here too, cleaver came later and continued for a long period. It may be mentioned here that a fossil remain of *Palaeoloxodon Namadicus** has been dated by Dr. S. Chatterjee of Jadavpur University by *Radiocarbon* method as belonging to an antiquity before 40,000 B.C. (P.C. Dasgupta 1971). Dr. Chatterjee in his report to the Directorate writes "Age measurement by C^{14} dating exceeds 40,000 years, the limit of sensitivity of our instrument". The geological horizon of the fossil material has not been properly explained and as a matter of fact, we can assume, if the find comes from the later deposites above the gravel layer, that is before 40,000 years ago people were there in this region.

From the above discussion and analysis, it may be assumed that in West Bengal both the handaxes and choppers co-existed simultaneously. At the present state of our knowledge, it will be very premature to say whether the handaxes were evolved from choppers as it has been suggested by many others. But in the pan-Indian context, it is logical to assume on the basis of relevant data that handaxes developed from choppers. The co-existence of both choppers and handaxes in West Bengal suggest differences in functional applicability. The emergence of cleaver coincides the technological improvement necessiated by specific function. The cleavers are always less in proportion which is mainly due to specialisation in functional approach of this tool. It is suggested that cleavers are developed from handaxes. This is also true in case of West Bengal in terms of it's morphological features as well as the stratigraphical records.

* Report submitted by Dr. S. D. Chatterjee of Jadavpur University (Head of the Dept. of Physics) on a fossilised teeth of *Palaeolexodon Namadicus* to the Directorate of Archaeology, Government of West Bengal on 4. 2. 1967.

CHAPTER X

Palaeoecology and Cultural Interactions

By the term ecology we mean the mutual relationships between environment and man. Attempts in this direction to visualize the ecology of even earlier periods have been made by many workers, and in such cases the help of basic materials like palaeontological, Palaeobotanical and stratigraphic compositions were taken into consideration (Gill 1975, Banerjee 1968, Prasad 1971, Mathur 1972, Prakash 1972, Tattersall 1969a, 1969 b).

Environment is perhaps most vital for understanding the culture and it's makers. Culture is the expression of interaction between environment and biological developments. If the environment is congenial or favourable, the role of culture remains less significant. But in case of uncongenial or unfavourable environment, the culture compensates the biological handicaps of Early Man to overcome the hostile and forceful environment. Early Man had to depend on culture not only to resist the negative parts of environment but also to protect him from the predators who lived at the sametime and in the same regions. It may be assumed on the basis of relevant data and information that Man was forced to make tools for his survival and otherwise he would have been extinct.

Environmental Features

The Palaeoenvironment during the Palaeolithic age in West Bengal can be reconstructed on the basis of flora fauna and to some extent by the geological stratigraphy along the river banks. There is no information regarding flora but there is some amount of information on faunal evidences from West Bengal during the Pliestocence period. The faunal evidences from West Bengal have earlier been described in the relevant context. The fossil vertebrate is identified from Susunia are :

1. *Palaeoloxodon Namadicus*	Elephant
2. *Panthera cf. Leo*	Lion
3. *Bos Namadicus*	Bovid
4. *Bos Sp.*	Bovid
5. *Bubalis Palacindius*	Buffaloe
6. Rodent	
7. *Crocuta Sp. Sivalensis*	Hyeena

From the above description, it is clear that during the Pleistocene period Susunia was rich with animal kingdom. To support this variety of animals, Susunia must have had come kind of forest or Steppe environments with well watered resources. The early hominids who thrived in this region during the Pleistocene period had to encounter with the hostile predators as well as with unfavourable climate and the expression of the same is manifested through the manufacture of innumerable stone artefacts. One may be wonder or imagine how the present bleak and dry mountaeineous terrains that streched over a wide area could have offered the flourishment of life and culture of early hominids.

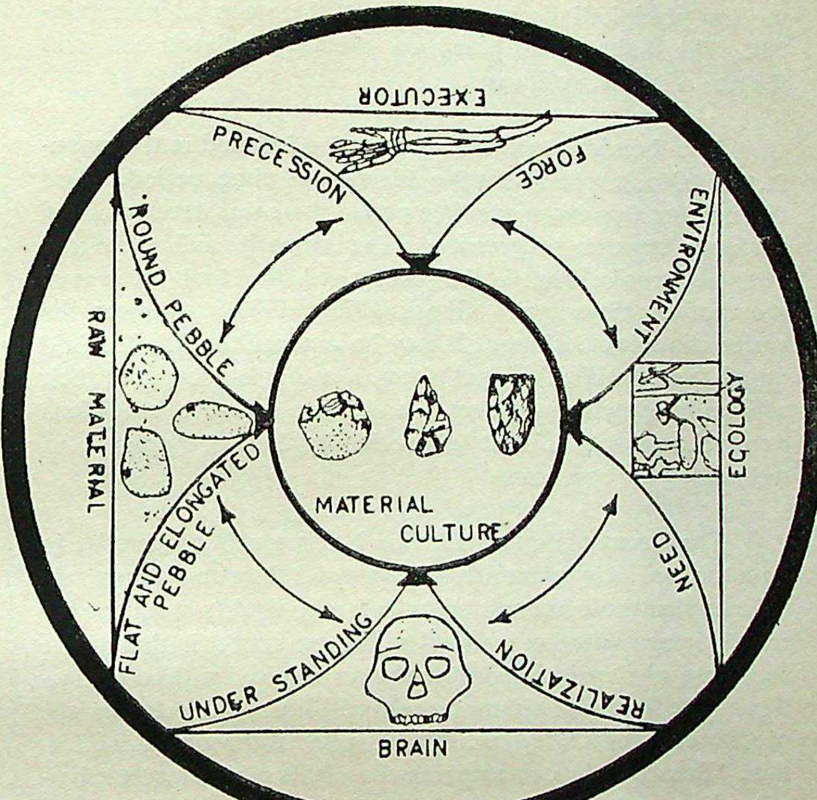
Palaeontologists have identified the following animal fossils from Suvarnarekha :-

(1) Bovidel; (2) Bos Sp.; (3) Rodent. According to Sastry of Geographical Survey of India. "On the basis of the available faunal and lithological data it is difficult to assign any definite age to the deposit containing these animal remains. However, this alluvial deposit can tentatively be assigned to Pleistocene Age". On the basis of the above information it may be assumed that this region during the Pleistocene period was rich with savannah or plant life with well watered resources. It is evident that the treeless environment was able to support a large variety of grazing animals (Sarunas 1978). The present arid and semi-arid land was the resort of palaeolithic savagery during the Pleistocene period.

Another way of reconstruction of palaeolimatic condition is the geological stratigraphy. From the examination of different stratigraphy in the five major regions in West Bengal, it appears that the broad sequence is more or less the same. There are alternate deposition of gravel and sand or silt or clay. These clustic sediments may be defined as coarser and finer particles. This alternate depositions are indicative of the fact that there was a climatic cycle with two major breaks—one of gravels and the other of silts. This two sediments may be related to the regimen of climate. It may be assumed on the basis of this two breaks that during the deposition of larger particles, there was higher precipitation which gave rise to the causes of erosion and transportation of gravels. During the period of less rainfall causing the disease in the volume of water, the finer particles like sand and silts are deposited along the river bed. The other interesting feature of stratigraphy in West Bengal is the replacement of gravels, sometimes, by laterite. Two types of laterites are generally found *viz*. primary and secondary. The primary laterite is formed by the residual weathering of the underlying rocks. when it is exposed, it is generally hard and massive. The secondary laterites are formed by the decomposition and rearrangements of primary laterite. The laterite found on the river banks are generally of secondary nature.

Hominid Cultural Interactions

To count balance the extreme climatic conditions, the


EXECUTOR
PRECESSION
FORCE
ROUND PEBBLE
ENVIRONMENT
RAW MATERIAL
ECOLOGY
MATERIAL CULTURE
FLAT AND ELONGATED PEBBLE
NEED
UNDER STANDING
REALIZATION
BRAIN

HOMINID CULTURAL INTERACTIONS

Fig. 10

hominids thrived best through his culture. The cultural materials generally associated with wet condition are found in the high gravels while in case of materials of dry period, it is generally found more towards the river. The hominids did not make much shift from the rivers, during the Pleistocene period, as it was the only water source. It may be assumed on the basis of relevant data and other informations that the hominids in West Bengal during the Pleistocene period had to face an alternate climatic condition of Wet with high rainfall and dry with less rainfall. Of course, there is a good deal of variation in term of precipitation. In the eastern part of West Bengal there was less precipitation and on the West, there was a higher rainfall. This inference is based on the height of river beds and the size of clustic sediments.

The hominids cultural interaction is found in the manufacture of tools throughout the Pleistocene time period. And through out this enormous time period there was developmental tendency towards progression. The climatic differences did not make much change in the process and the tool kit was a short of omnibus type (Ghosh 1973c, 1973d) to meet the varied climatic conditions. It may be assumed that the hominid population in West Bengal formed a single group and their actions and reactions against the extreme climatic conditions were not so much different as revealed by the tool typology and technology are concerned.

The forces of natural selection is very much in operative in both animal and plant life. A study on flora and fauna will indicate that those animals and plants who could not survive the contemporary selection mechanism became extinct in due course and those who maintained the balances survived with modification. The hominids are no exception. It was subjected to the process of natural selection. But it survived through modification. Because the contemporary hominids maintained the balance by encountering successfully the environment on the one hand and on the other hand it thrived best towards progression as expressed by the development of cultural material (Fig. 10). I am afraid that the present day form of *Homo sapien sapien* to which we all belong, might have changed to a better form of species in due course, if we are able to keep the balance of natural selection, otherwise we would have been extincted.

Finally the density distribution of each type is shown in a map (Fig. 11) to find out the eco-cultural zone during the palaeolithic period in West Bengal.

The density distribution of handaxe shows that Susunia and Kankradara regions in Bankura have the maximum concentration of handaxes. This density population of handaxes

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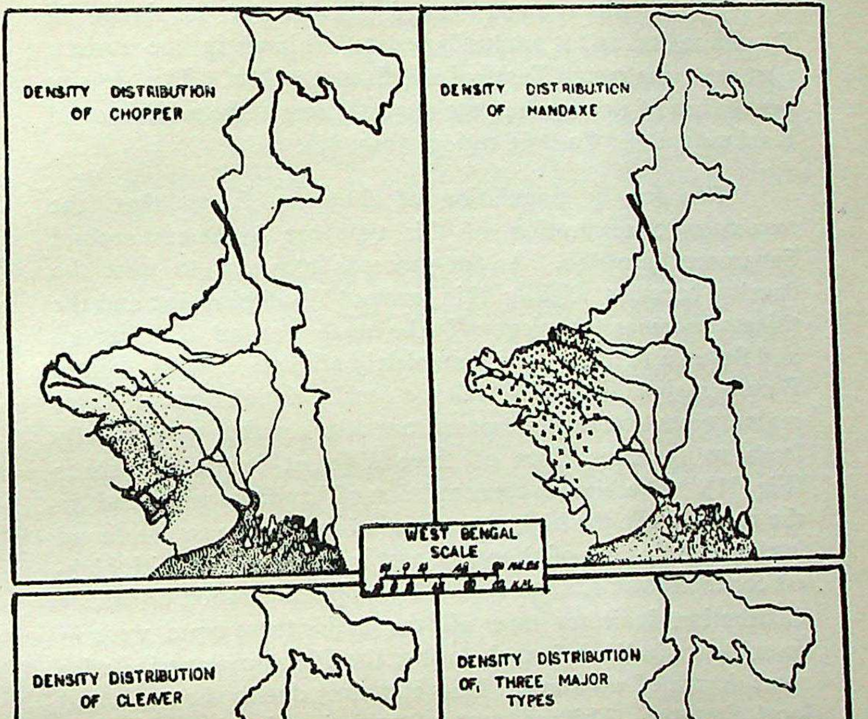
DENSITY DISTRIBUTION OF CHOPPER
DENSITY DISTRIBUTION OF HANDAXE
WEST BENGAL
SCALE
MILES
K.M.
DENSITY DISTRIBUTION OF CLEAVER
DENSITY DISTRIBUTION OF THREE MAJOR TYPES

Fig. 11

become slightly thin around Purulia and Tarafeni regions and it becomes more in Suvarnarekha region (Fig 11).

The density population of cleavers are maximum in Purulia region and it gradually becomes thinner in the eastern part centering round Tarafeni and Suvarnarekha. The density population of cleavers become almost scarce in the north around Kankradara and Susunia regions (Fig. 11).

The density population of choppers shows that the maximum concentration of this type are in the east around Suvarnarekha region. As one proceeds from east to west the density becomes slightly thin around Tarafeni region and the thiness becomes conspicuous in the north around Kankradara and Susunia regions. It is completely nil further west around Purulia region (Fig. 11). All the density population of three major types are superimposed one after another which finally leads to the emergence of three different eco-cultural zones (Fig. 11). The highest concentration of handaxes are found in the north, while the highest concentration of cleavers are found in the west. In case of choppers, east is the focal area with highest concentration of this type. The superimposition of density distribution indicates that all the major three types were in co-existence in West Bengal during the Pleistocene period with some degree of variation. This is mainly due to the needs and local factores. This amount of variation in the percentage distribution of three major types may be explained in terms of local topography of the land, geology, environment, ecology and such other forms which had a bearing upon the relevant context. This is specially interesting to note that when the early hominids know the technology of manufacturing the three major types, they did not make it proportionately, because the needs and environment of a particular place was not quite identical to other parts. This is perhaps the reason for which some amount of variation is noticable during the palaeolithic period in West Bengal and this variation, in its turn, give rise to there eco-cultural zones.

The cleaver zone of the highest concentration of this type is found in Purulia. The cleavers with broad cutting edge might have been used for cutting down trees. So, it may be assumed that Purulia might have had a forest ecology with higher precipitation.

In case of choppers, it was perhaps used for chopping and crushing. The chopper zone or the highest concentration of this type is found in the east around Suvarnarekha region. This area may be considered as semi-arid area or savannal land. The higher concentration of choppers in this area. Speaks of the specific requirement of this type during the palaeolithic period.

The handaxes were used for digging roots and piercing animals. The handaxe zone or the highest concentration of this type is found in the north around Susunia. This area may be considered as neither too wet nor too dry. It had a steppe land.

The central part, centering round Tarafeni and Kankradara might have served as a common corridor for the frequent movement of the hominids.

CHAPTER XI

Summery and Conclusion

In search of history of Man and his culture in West Bengal, it was found that the palaeolithic culture (Early Stone Age) was the first endeavour of Man towards progression during the Pleistocene period. This was expressed, though in the incipient form, through the manifestation of culture. (1) This cultural traits, in the form of stone tools, were found all over the south-western part of West Bengal. (2) The first attempt to make a tool marks the onset of culture in this part which still persists in some form or other (3) The meticulous absence of *Homo-Erectus* people in West Bengal is conspicuous specially in terms of it's material culture in the form of stone tools and later finds of *Homo-sapien-sapien* from Sijua. The possibility of *Homo-Erectus* fossil find from India has been suggested by a number of scholars. The discovery of Sijua find is both significant and indicative to the above possibilities.

West Bengal has its own identify specially in respect of her physiography, climate and its people. (4) In the cultural make-up of India; it played an important role during the dim past. (5) Bengal during the Pleistocene period served as a corridor of east-west movement of culture as both the chopper and biface traditions are found to concentrate here.

(6) During the palaeolithic period (Early Stone Age), all the three major types *viz.* choppers, handaxes and cleavers are found here along with intermitent occurrence of scraper and discoids.

(7) From the available reports as well as the works of the author himself, all the sites belonging to Lower Palaeolithic period in West Bengal have been compiled and the resultant picture is the emergence of six major localities which finally gave rise to five regions on the basis of similarities, dissimalirites and proximal distance from each other.

The frequencies of choppers, handaxes and cleavers from the five regions have been worked out and the analysis shows that all the three types were present in almost all the areas. Despite the common similarities, the dissimilarities in terms of percentage distribution of each type are also there. Attempts have been made to account for the same.

Distribution of each types along with the percentage coverage have been made and finally an iso-type map has been prepared which indicates the variation within the Lower Palaeolithic culture in West Bengal. (8) The density distribution of each type, have been worked out which finally gave rise to three eco-cultural zones. In the final analysis, it was found that Purulia, Susunia and Suvarnarekha were three major cultural zones in West Bengal during the Palaeolithic period having maximum coverage of three different types.

The stratigraphic column along with the lithology from different areas help to date the industry and the environmental features. The environment must have played a significant role with regards to man's constant struggle towards progression. (9) The *hominids* who lived during that period must have witnessed the alteration of environments and the rections to the same had been expressed through the changes of the cultural traits and that too had been directed to cope with the situation. If the environment demands a change both in physical outfit and cultural traits, there will be corresponding changes. One who fails to respond to this changes will become extinct in due course. There is a constant pressure both from within and outside for changes. The necessity for changes are variable. It all depends on certain factors. Where the necessity for changes are of prime importance, the rate of changes there to are of immense as in the case of *hominid* people, and where the necessity is less, the rate of changes is almost static as in the case of certain animals.

(10) In West Bengal during the Middle Pleistocene period, the *hominids*, the maker of Lower Palaeolithic culture in West Bengal went through a gradual process of changes both physically and culturally. These changes are marked in the manifestation of stone tools from cruder to finer quality. This refinement of stone tools was made possible with the development of superior technology.

PART III

CHAPTER XII

Middle Palaeolithic

The Middle Palaeolithic phase in West Bengal is quite different from that of European Middle Palaeolithic culture where it is characterised by a number of traits.

(1) In Europe, the Middle Palaeolithic Period is known as Mousterian culture.

(2) In Europe, the Mousterian culture is associated with the *Homo-Neandarthalensis people*.

(3) The Mousterian culture of Europe is divisible into a member of phase (Bordes, 1953, 61, Mellars, 1967, 1969) :—

   (a) Mousterian of Achculian;

   (b) Typical Mousterian;

   (c) Denticulated Mousterian; and

   (d) Charentian Mousterian
   (Ferrassie and Quina)

There is a good deal of controversy over the different industrial units within the Middle Palaeolithic. Bordes (1973) considers these industries as the product of different cultural traditions, while others explained the assemblage as specialised activities of a single group (Binford 1966, 1969). According to Bordes different cultural groups co-existed in the same area with different tool-making tradition. The other group of scholars hold that a single group is responsible for different tool traditions. This differences in tool traditions was required for different activities.

None of the above traits are found to be associated with West Bengal Middle Palaeolithic phase. However other traits of European Middle Palaeolithic culture are similar.

1. In both the cases, the old tool typology have been replaced by a new set of tool types.

2. In both the cases, the Middle Palaeolithic industries are found to be confined within Pleistocene period.

3. Both in Europe and in West Bengal, the Middle Palaeolithic industries are marked by the introduction of new techniques.

Both the similarities and dissimilarities are there and this is mainly due to local needs and contemporary environmental episodes which gave rise to the variations. At the present state of our knowledge, nothing can be said difinitely till the other characters are scarched for. The West Bengal Middle Palaeolithic phase lasted for a very short period of time. The emergence of Upper Palaeolithic phase considered with the appearance of modern Man (*Homo Sapiens*).

DISTRIBUTION OF SITES

In West Bengal, there are at least five regions yielding Middle Palaeolithic artefacts (Fig. 12).

Purulia Region

(a) Nangshai

The cliff section of the stream near Nangshai has yielded Middle Palaeolithic artefacts. This area was explored by

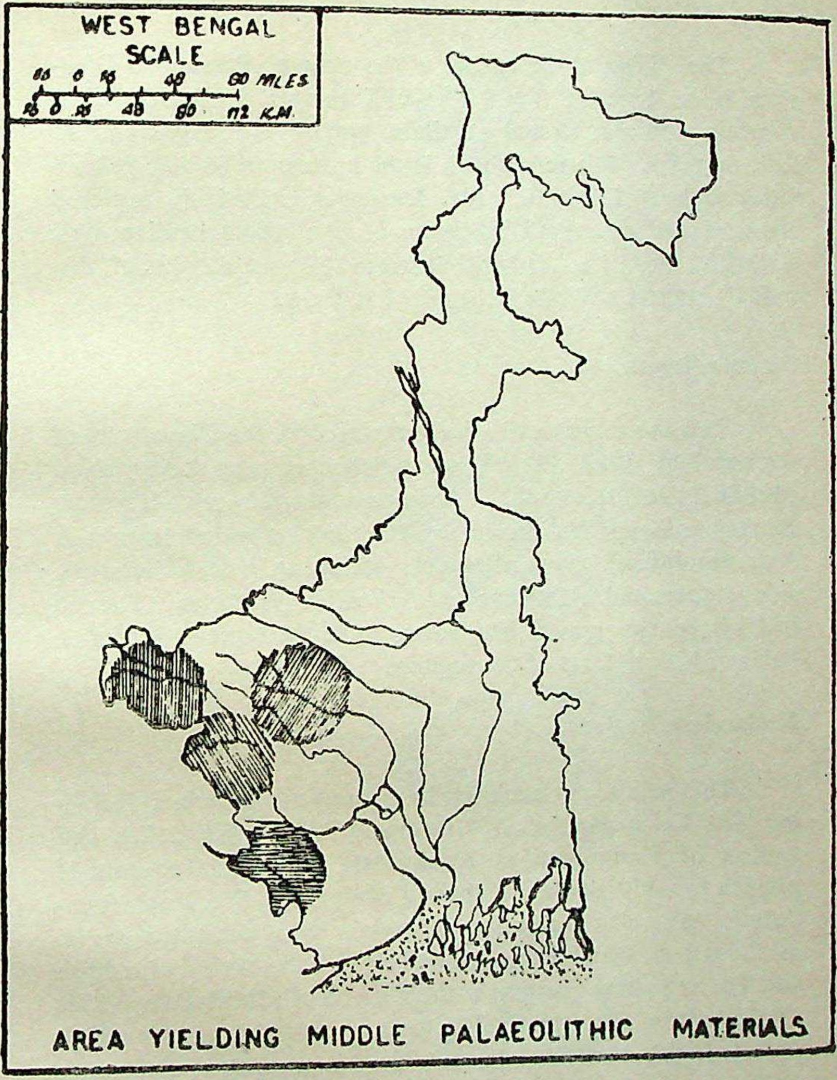
WEST BENGAL
SCALE
0 15 48 60 MILES
0 48 80 112 K.M.
AREA YIELDING MIDDLE PALAEOLITHIC MATERIALS

Fig. 12

P.C. Dasgupta and he has reported the occurrence of points made on Levalloision flake. The material used is quartzite.

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(b) Deultarn

The cliffs and the terrace of the stream Pandu at Deultarn is as high as 6 m. The cliff reveals the basal rock is overlain with reddish and at times greyish silt deposition of 1.50 m. thick. The reddish silt is the horizon of Middle Palaeolithic tools at Deultarn. Mr. Dasgupta extensively explored the area and recovered a claver of evolved Acheulian type flaked on quartrite. Other tools from this area consists of discoidal scrapers and late Acheulian handaxes.

Susunia Region

This area was extensively explored by the Directorate of Archaeology West Bengal. A number of sites have yielded Middle Palaeolithic tools. The important sites are—Hapania, Bankajor, Jaypur and Susunia. The tools recovered from this area are different types of scapers including hollow Scrapers, side scrapers and highly evolved Acheulian handaxes. The red soil above the gravel bed seems to be the horizon of Middle Palaeolithic artefacts of the regions.

Kankradara Regions

This region was explored by a number of scholars including V.D. Krishnaswami, A. Ghosh and P.C. Dasgupta. The cliff section of Kangsavati at Kankradara reveals a sequence of pinkish to whittish clay of about 1.50m. above the basal foundation. The clay deposition is overlain by a cemented gravel of about 1 m. which is again overlain by a deposition of reddish silt. The red silt deposition is the horizon of Middle Palaeolithic artefacts from this region. The tools recovered from this region include highly evolved Acheulian handaxes, scrapers and waste flakes.

Suvarnarekha Region

The Suvarnarekha basin is very important in respect of palaeolithic culture in West Bengal. In 1969, the Directorate

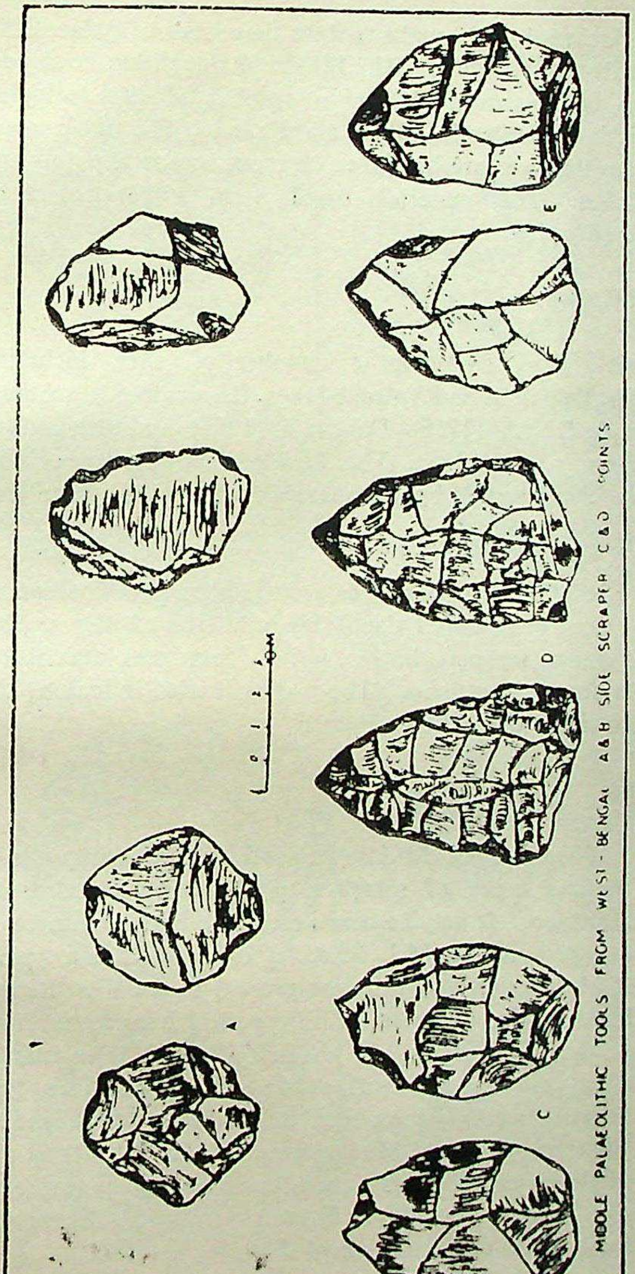

A
B
C
D
E
0 1 2 3 4 5 CM
MIDDLE PALAEOLITHIC TOOLS FROM WEST-BENGAL A&B SIDE SCRAPER C&D POINTS

Fig. 13

of State Archaeology brought to light thousands of palaeolithic artefacts from this region. The Middle Palaeolithic tools are found to be concentrated over a number of sites including Ghorapincha, Phulbani, Indbera and Patina. The tools recovered from this area are handaxes, cleavers, scrapers, points and waste flakes. The materials used were either quartz or quartzite (Fig. 13).

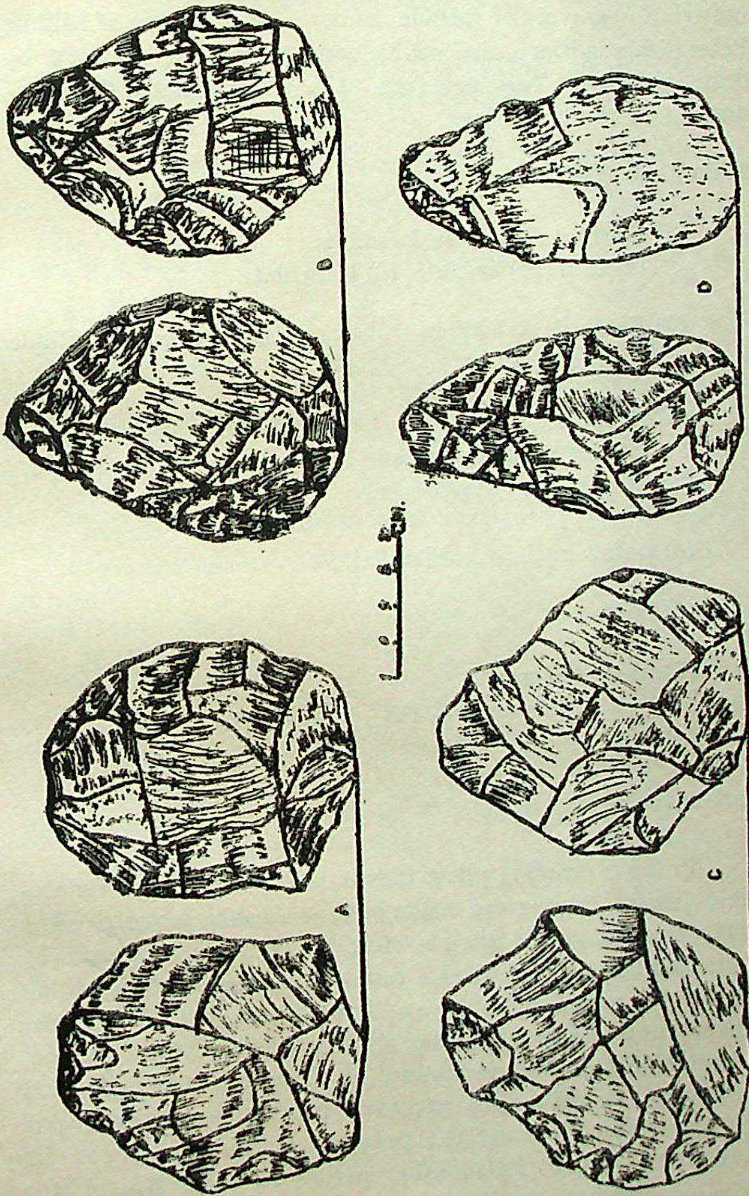
Tarafeni Region

This region comprises a number of sites including Bamandih, Belpahari and Vaisnabdanga. A number of scholars including A. Ghosh (1966), Dasgupta (1971) and the author (1979) have worked here. The Pleistocene deposites of this region is characterised by alternate deposition of gravel and slit.

The junction of upper loose gravel and upper silt seems to be the horizon of Middle Palaeolithic industries of the region. Various types of scrapers, borers, points, handaxes and flakes have been found from here. The materials used in making the tools were either quartrite or quartz.

Tool-Types

The West Bengal Middle Palaeolithic tools comprises of mainly various types of scrapers, points, handaxes, cleavers, flakes and borers. It may be mentioned here in this connection that *bout coupe* handaxe (M.L. Shackley 1977) which is a typical marker of Mousterian industries are present in the West Bengal Middle Palaeolithic industries. This type has been found from Tarafeni region. This type of handaxe which is triangular or D shaped are very thin and well refined (Fig. 14). This type of handaxes are specially present in British Mousterian industries. This type belongs to Mousterian of Acheulian tradition. In most of the cases, the tools were either made on quartzite or quartz. As a matter of fact, the material used during the Middle Palaeolithic phase remained the same as that of previous period. The size of the tools have been reduced to a


B
A
D
C
0 1 2 3 4 5 CM.

MIDDLE PALAEOLITHIC TOOLS: A.B.C. &D. SMALL HANDAXES

Fig. 14

considerable extent. In the previous phase, the basic form of materials were either pebble or core. But in case of Middle Palaeolithic industry, the pebble/core have been replaced by flake elements. This new form of material initiated the introduction of new technology.

Main Tool Types

(1) Evolved Acheulian handaxes :
    (a) oval (b) cordate (c) lanceolate

(2) Evolved Acheulian cleavers mainly with oblique cutting edges.

(3) scrapers :
    (a) side scrapers (b) end scrapers (c) hollow scrapers (d) scrapers cum borer.

(4) points on Levalloisian flake

(5) borer

(6) waste flakes, and

(7) cores.

Techniques

In the preceeding phase that is during the Lower Palaeolithic phase, tools were made either on pebble or core. The flakes were detached first by free flaking and later on by controlled flaking. The flakes removed by these techniques left high angles, prominent bulbs and bold flakes sears. But in the subsequent phase that is during the Middle Palaeolithic period, an additional technique known as Levalloi's technique was introduced. Flakes with prepared platform are found during this phase which indicate the presence of this technique. So during the Middle Palaeolithic period in West Bengal, the Levallois technique heralded a new phase, while the old techniques persisted side by side giving new impetus.

SUMMARY AND CONCLUSION

(i) In West Bengal, the Middle Palaeolithic phase was succeeded by Lower Palaeolithic culture.

(ii) The Middle Palaeolithic in West Bengal continued for a very short period of time.

(iii) The Middle Palaeolithic in West Bengal forms a single cultural unit.

(iv) The material used during the Middle Palaeolithic phase in West Bengal remained the same as it were during the Lower Palaeolithic that is either quartz or quartzite.

(v) The sites of Middle Palaeolithic phase are found to be concentrated to those areas where from Lower Palaeolithic materials are found.

(vi) The scrapers and points are very numerous types during this phase.

(vii) The geo-stratigraphical horizon of the industry is the junction of upper loose gravel and upper silty deposition.

(viii) The size of the tools during this phase were reduced to a considerable extent.

(ix) The handaxes and cleavers are found to be continued for some time during this phase while in case of choppers, it is totally absent.

PART IV

CHAPTER XIII

Upper Palaeolithic

The Upper Palaeolithic materials have been reported from a number of places in West Bengal including Tarafeni, Giridangal, Nalhati, Deulpota· Sriniketan, Susunia, Purulia and Suvarnarekha. The geo-stratigraphical position of industry in West Bengal is the horizon of Red silt of late Pleistocene. Though the tools have been reported from a number of places, but so far no attempts have been made to understand the culture in a better perspective. The tools of this phase, are mostly made on flakes, but the percentage of blades are also highly significant. The size of the tool became smaller and the number of types are quite larger. Further the industry is marked by the change of raw materials. Where as in the Middle Palaeolithic quartz or quartzite were mainly used, in the Upper Palaeolithic industry jasper, chalcedony, flinty chart, quartz and other silicious rocks were most numerous. This change of raw materials definitely speak of a change in the contemporary environment which had been expressed through the manifestation of cultural change. Except Belpahari and Deulpota, all the information of Upper Palaeolithic sites have been compiled from different sources including the personal communications from P.C. Dasgupta.

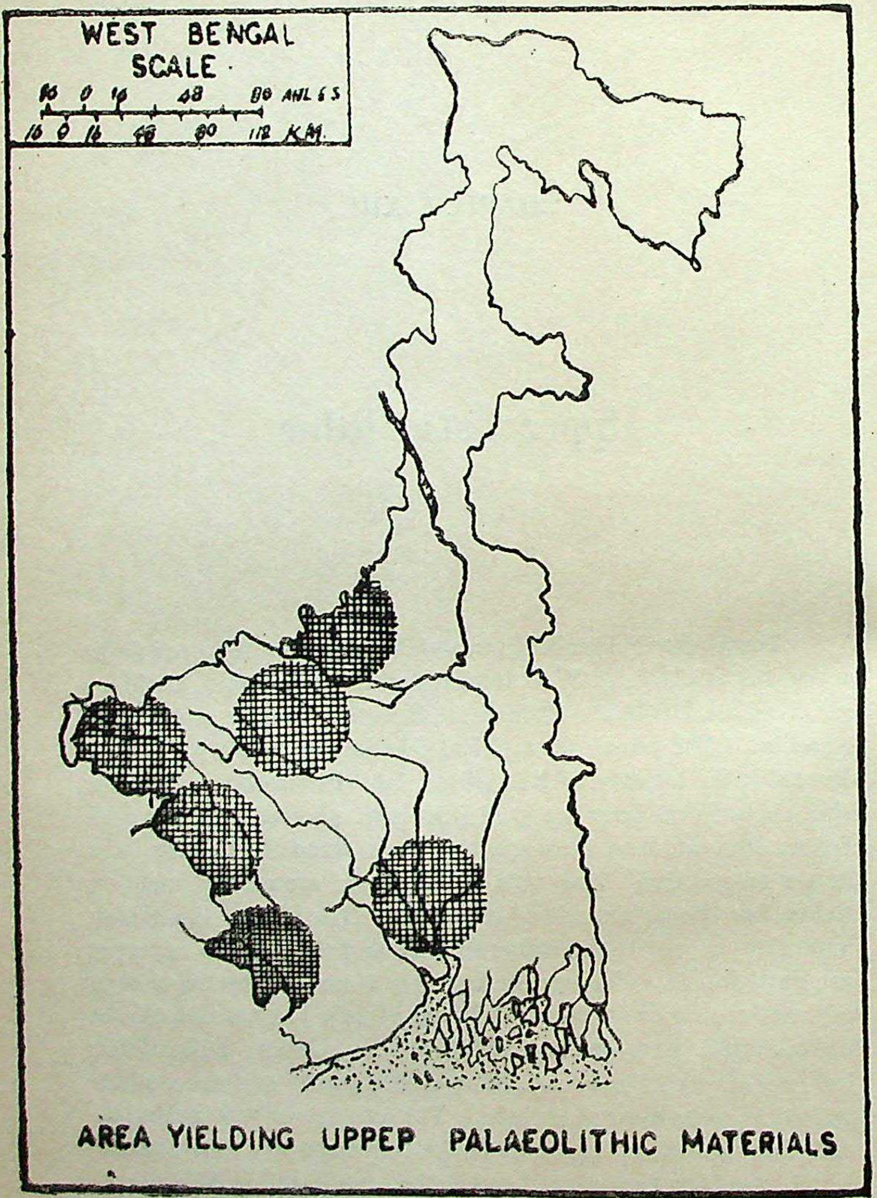

WEST BENGAL
SCALE
16 0 16 48 80 MILES
16 0 16 48 80 112 KM.
AREA YIELDING UPPEP PALAEOLITHIC MATERIALS

Fig. 15

DISTRIBUTION OF SITES

Nalhati

This is within the Rampurhat Sub-Division of Birbhum district. The high terrace associated with the temple of Lalateswari and other sites in the vicinity area have yielded Upper Palaeolithic materials including various types of scrapers, points and blades. The geological horizon of the industry seems to be the red silt deposition of the area. The material used were either jasper or flint.

Giridongal

This place near Hatempur is within the Sadar sub-division of Birbhum district. This area has yielded Upper Palaeolithic materials namely scrapers and blades. The material used for the manufacture of tools was red jasper. The tools were recovered amidst the red silt deposition of the area.

Sriniketan

This area falls within Bolpur sub-division of Birbhum district. The eroded landsurface is found to be exposed at places. The reddish silty deposit, beneath the yellowish sandy silt were found scattered with Upper Palaeolithic tools consisting of mainly scrapers, blades, knives, points, arrow-heads etc. The place is situated on the bank of Kopai. This industry will throw light upon the culture of this area and it may assume that this culture, no doubt, emerged in this part of Bengal before the down of Mesolithic culture. The material used were chart and flint.

Deulpota

This area near Diamond Harbour is within South 24-Parganas. This area has perhaps yielded the first stone age tools at a place down to the lower ganga valley. Though the Deulpota tools have been assigned to Middle Stone Age by both P.C. Dasgupta and R.V. Joshi, the author on subsequent examination of the tools as well as visit to the site, convinced that it actually belongs to Upper Palaeolithic industries. All the stone age sites, in West Bengal are found to be located away from the alluvium tracts. Because this alluvium deposits are supposed to have a later origin. So doubts were expressed

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from many quarters about the genuineness of the artefacts. However the Deulpota site has set aside all the conventional ideas.

As the explorers of the Directorate of Archaeology could not located the implementiferous deposit subsequently in the year 1965, a joint survey of the area was undertaken by the Directorate of Archaeology and Superintendent, Prehistory Branch of the Archaeological Survey of India to ascertain the geological horizon of tools. They examined an area covering a distance of approximately 8–10 miles and found the occurrence of discontinuous patches of sand mostly as and around Deulpota. They came to the conclusion that the sandy deposit is the horizon of the artefacts as it yielded a large number of nodules besides the well worked and finished implements.

The tools recovered from Deulpota consist of unifacially worked sub-triangular points, borers, side-scrapers and hollow scrapers. The tools were made either on brownish chart or Chalcedony. R.V. Joshi, while reviewing the tool kit from Deulpota writes : "An interesting aspects of Deulpota tools is that they are generally of dimunative form which may be either due to smallness of the available chart nodules on which they were worked out or it may be a special character of this lower ganga Middle Stone Age industries".

Purulia

A number of peaces have yielded Upper Palaeolithic tools including Amruhasa, Nangsai and Bandu. The tools consisted of mainly scraper, points, blades, burins and borers. The materials used for the tools were chart. The tools have been recovered from upper loose gravel. This is quite unusual because in most of the areas we have found that the red silt is the implementiferous horizon of Upper Palaeolithic industries in West Bengal.

Suvarnarekha

A large number of sites including Ghorapineha, Hatimara, Bhaduahur and Sapkatha in the Suvarnarekha regions have yielded Upper Palaeolithic tools. This region was extensively explored by the Directorate of Archaeology and had brought to light thousands of Palaeolithic industries. The tools from this region included various types of scrapers including hollow and side scraper, points, blades, burins and waste flakes. The materials used were either flint or chert. The geological horizon of the tools are supposed to be the red silt deposition of the region.

Susunia

This region around Susunia hills has yielded tools of Upper Palaeolithic offiliation including hollow scrapers, side scrapers, round scrapers, blades, paints and flakes. The material used was chert. The clay deposit beneath the recent deposition is supposed to be the horizon of Upper Palaeolithic industries of the region.

Tarafeni Regions

This area was extensively explored by the author as well as by a number of scholars including Ghosh and Sen. This region has an important bearing on the palaeo-history of West Bengal not only because it has produced a largen umber of stone tools but because tools were found *in situ* from this region. A number of sites have yielded Upper Palaeolithic tools including Bamandih, the most important site of the region. The tools include scrapers, paints, knives, blades and flakes. The materials used here was chert. The geological horizon of the tool is upper silt above the upper loose gravel.

From this region, the author has discovered Upper Palaeolithic materials mainly consisting of punch tools, the reference of which was first made by Prof. Sankalia (1963 pp. 77). Though Prof. Sankalia considered the tool as belonging to Middle Palaeolithic phase but if actually belongs to Upper Palaeolithic industries. Because this pointed punch tools were actually used for removing flakes, a technique which was not

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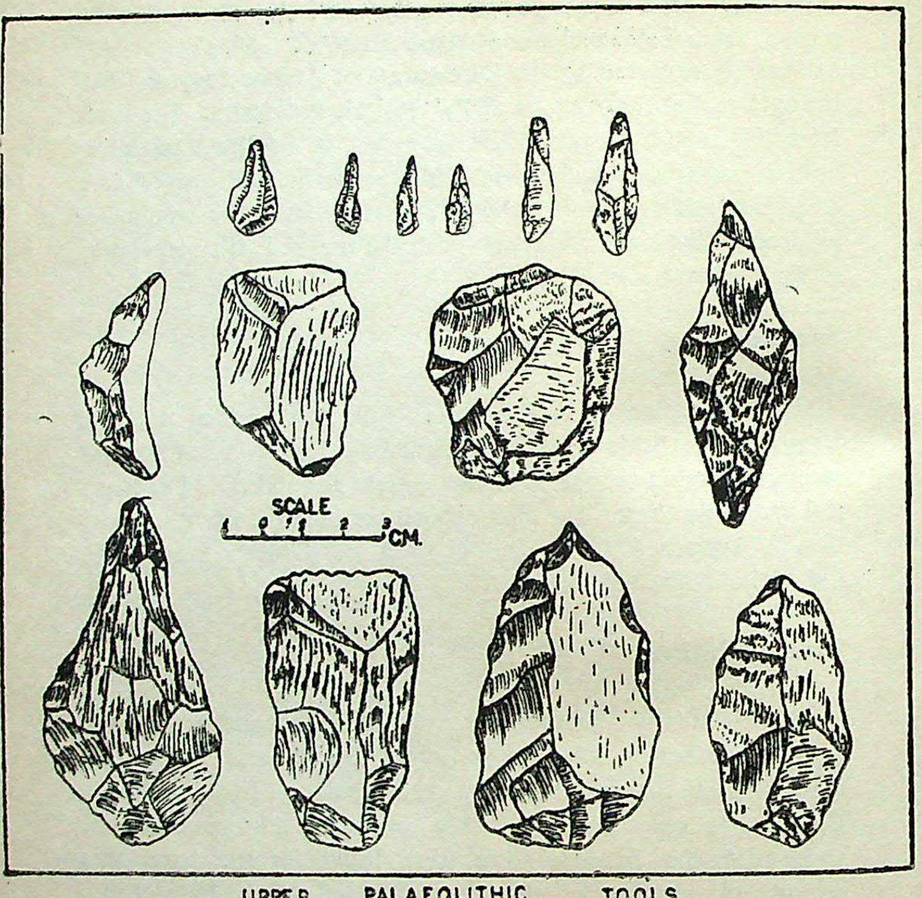

UPPER PALAEOLITHIC TOOLS

Fig. 16

known during the Middle Palaeolithic times. The tools recovered from this region consist of sharp pointed punch like implements, arrow-heads, scrapers, crescents with oblique cutting edge, points, blades and borers (Fig 16), tools were made on quartz. This is quite unusual. Because in most of the cases, we have found that either chert, jasper or flint were used as materials by the Upper Palaeolithic man. Quartz is considered as a very hard rock and it is very difficult to get a desired shape out of it. Another interesting feature of this tool is the dimunative character of the tools which we have earlier found at Deulpota. In this connection, the explanation may not be tanable here because in

Deulpota, raw materials may be very scared but here the raw materials are abundant. The largest tool being 10 cm and the smallest is 2 cm.

TOOL TYPES

In West Bengal the Upper Palaeolithic tools consist of mainly various types of scrapers, points blades, borins, barers, arrowheads and flakes. The tools during the upper palaeolithic period have further been reduced to a considerable extent. There was also a shift from the previous period in term of raw materials. In the preceeding phase, we have found that it was either quartz or quartzite was the main source of material whereas in the present case jasper, chert, flint and in one instance quartz were used as raw materials. This change of raw materials indicate a basic change in economy. In other parts of the country, the Upper Palaeolithic phase is characterised by blade-burin industries, where as in West Bengal the flake blade element are very prominent in the industry. The presence of burin in West Bengal are very rare. This may due to regional variation.

Main Tool Types are :

(i) Points (a) simple unworked point
(b) tranchet like point
(c) leaf point

(ii) Scrapers (a) side scrapers (b) hollow scraper
(c) end scraper (d) round scraper
(e) scraper cum borer

(iii) Borers (a) borer
(b) borer cum scraper

(iv) Burin

(v) Knives

(vi) Blades

(vii) Flakes

(viii) Cores

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TECHNIQUES

During the Upper Palaeolithic phase in West Bengal, the form of raw materials were either flake or blade. Flakes were found to dominate over blades in terms of percentage. In the subsequent phase that is during the Middle Palaeolithic phase, flakes were detached by prepared core or levallois technique. But during the Upper Palaeolithic phase, punch or pressure technique was introduced for detaching blades. By this technique, pointed punch like implements placed on core, are pressed hard till a narrow parallel sides blades would come out. The introduction of this new technique haraled a new era and as a matter of fact a number of types were produced during this phase. But this does not mean that the old techniques were abandoned with the advent of new technique. The new technique along with other techniques, continued for a considerable period of time. The necessities helped man to acquire better technology. It has been suggested that technological development might have had something it do with biological characters. In that sense the brain and hands played a important role; because the former understood and visualized the needs for benefit and the idea were materialized through hands. The development of techniques were aimed at the improvement of functional aspects which can be achieved through the modification of shapes, symmetry and better working area.

SUMMARY AND CONCLUSION

The Upper Palaeolithic phase in West Bengal is characterised by a number traits.

(1) The Upper Palaeolithic phase in West Bengal usually define a progress of culture in conformity with the slow change in economy from gradually uncertain to a more assured way of hunting and foodgathering while the technological advancement in preparation of specialised varieties went on.

(2) The change of raw material is also marked during the phase. Instead of previously used quartz and quartzite, the people during the Upper Palaeolithic phase used flint, chert jasper and hardly quartz.

(3) The Introduction of new technique during this phase is indicative of an advancement in technology over the previous one.

(4) In most of the cases, the Upper Palaeolithic industries are found to be confined the red silt deposition sometime underlying the upper loose gravel and sometime by detrital laterite.

(5) The tools belonging to Upper Palaeolithic phase, recovered from different parts of India are considered as Blade-Burin industries. But in West Bengal the presence of burins negligible in term of percentage distribution. In Bengal the high percentage of scraper is very significant.

(6) The discovery of punch like implements from Tarafeni region is also highly significant.

(7) During the Lower and Middle Palaeolithic phases, the sites were almost confined to the South Western part mainly covering the fringe are of Chotanagpur Plateau. But during the Upper Palaeolithic phase, the spread of sitese away from the old landmass down to the lower deltic region of gange, is also interesting to note. One may find it difficult to explain the finds from Deulpota region which is considered as recent.

(8) The Upper Palaeolithic in West Bengal continued for a considerable period of time in comparison with the Middle Palaeolithic.

(9) The Upper Palaeolithic in West Bengal was succeeded by Middle Palaeolithic phase.

(10) The geo-stratigraphical horizon of the industry is the upper silt deposition.

(11) The size of the tools during the phase were further reduced to a considerable extent.

(12) The choppers which are supposed to have been reappeared during the Upper Palaeolithic phase, are totally absent in West Bengal.

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Index

Abbevillian, 27, 28, 91, 99
Abbevillies Acheulian, 27
Acheulian, 70, 91, 92, 96, 99, 127. 130, 132, 134
ad hoc, 21, 23, 90
Adzes 75
Africanus, 23, 24
alluvium, 39, 51, 54, 59, 62, 141
Attitudes, 50
Ambha. 71
Amjur, 70
Amruhasa, 67, 74, 100, 142
Amud, 30
Anthropoid, 23
Anthropology, 65
antler, 60
Anyathian, 75, 83
ape, 20, 23, 28
Archaeology, 44, 56, 58fn, 60, 61, 65, 74, 81, 83, 100, 101, 113 fn, 130, 132, 142, 148
Archean, 54, 55, 72
Argon, 111
arid, 61, 68, 83, 116
arrow-heads, 141, 144, 145
artefacts, 18, 61, 63, 68, 70, 71, 74, 79. 81, 100, 103, 112, 115, 128, 130, 132, 142,
Asanail, 54
Askala. 71
Astayuri, 73
Astragalus 59
Attirampakkam, 40
Aurignaiian, 45
Australopithecus, 21, 22, 23, 24, 26
Ayadla, 55

Babladanga, 63, 75
Baddih, 75
bad lanus, 55
Bagmundi, 74
Baliadahar, 70
Balikhua, 75
Baltona 62, 111
Bamandih, 71, 73, 132, 143
Bandina, 75
Bandu, 67, 74, 100, 142
Banganga, 38
Bankajor
Bankathi, 68, 73, 75, 83, 99
Bankura, 39, 52, 54, 55, 63, 65, 67, 73, 74, 76, 96, 104, 108, 118
Banspahari, 73
basalt, 81, 130
Beas, 38
bed rock, 77, 78, 79, 82, 83, 112
Belan, 44, 45
Bel Pondhari, 42
Beldhia, 58
Belphari, 67, 71, 73, 77, 97, 132, 139
Berach, 41
Bezing, 25
Bhaduahr, 143
Bhaduahuri, 70
Bhagasole, 71
Bham Do Dhi, 71
Bhanrasia, 74

bifacial, 38, 89, 96, 122
Biharinath, 55, 68, 75, 83, 96, 99. 100, 102, 103
BILASPURENSIS, 19, 20, 26,
biological, 17, 18, 22, 32, 92, 114, 145, 146
bio-stratigraphy, 45
bipedel, 23
bipedalism, 21, 23
Birbhum, 52, 54, 67, 140, 141
Birinda, 75
Blade, 34, 93, 141, 142, 143, 144, 145, 146
blade-burin, 44, 145, 147
bladelet, 84
blizzards 50
blocks, 55, 88
bone-tools, 44, 45, 61
Borers, 42, 43, 95, 132, 134, 142, 144, 145
Bos 56, 60, 72, 115
Bos namadicus, 57
Bos Namadicus Felcon, 42
bout coupe, 132
bovidale, 56, 59, 61, 62, 115. 116
brain, 25 27, 28, 30, 92, 117, 146
bricks, 51
bronze, 32
brows, 50
brow-ridges, 29
Bubalis, 57, 115
Burdwan, 52, 54, 67
burins, 98, 142, 143, 145, 147
buttend, 89

Calrcarious, 54, 55
Canine, 21, 25, 58
Carnivora, 56. 57
Cemented, 42, 81, 130
Cervidae, 56, 62
Cervus, 69
Clustiic Sediments, 72
Chaida, 75
Chalcedony, 149
Chandevilla, 70
Chappleaux Saints, 30
Chaudara, 71
Charentian, 127
Cheeks, 29
Chelonia, 56
Chert, 43. 44, 68, 71, 88, 141, 142, 143, 144, 145, 146
Chhatinasole, 70
Chooto Tarki, 69, 70
Chin, 29
Chinji, 20
Chipping, 33
Chittor, 44
Choppers, 35, 31, 39, 40, 41, 43, 71, 75, 83, 90, 91, 92, 94. 97, 98, 99, 100, 101, 102, 103, 104, 105, 107, 107, 108, 109, 110, 111, 112, 113, 119, 120, 121, 122, 123, 135
Chopper-Chopping, 34, 35, 38, 68, 96, 109
Chotanagpur, 52, 53, 55, 76, 72, 96, 99,108, 147
Chou-kou-hien, 25, 28
Chunks, 88
Clay, 45, 52, 54, 81, 82. 83, 85, 86, 87, 116, 130
Cleavers, 38, 39, 40, 41, 43, 68, 71, 74, 75, 92, 93, 94, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 107, 108, 109, 110, 111, 113, 119, 120, 123, 132, 134, 135
Cliffs, 68, 69, 71, 73, 130
Cliff-Section, 70, 73, 83, 130
Climate, 17, 18, 22, 31, 51, 55, 58, 61, 83, 84, 85, 87, 116, 117, 118, 122
Caou-kou-tein, 25' 28.
Chunks, 88
Cobble, 52, 72, 88
Coch Behar, 52
Combe Capelle, 31
Concave. 93
Conchoidal, 88
Congenial, 114
Conglomerate, 88, 85, 86, 112
Conjucture, 18
Contextual, 18

Convex, 93
Cordate, 99, 134
Core 43, 89, 93, 94, 96, 97, 134, 145, 146
Corridor, 20
Cortical, 89
Crests, 50
Cristatus, 57
Crocodillia, 56, 57,
Crocuta, 57, 58, 61, 115
Cro-mainon, 31
Cuv, 59

Dahamura, 70
Damodar, 67, 75, 100
Damoh, 39
Darjeeling, 52
DBYOPITHECUS, 26
decomposition, 55, 116
degradation, 52
delataic, 52, 53, 147
Denticulate, 127
dentition, 20
depression, 52, 54
detrital, 51, 52. 53, 55, 78, 83, 86, 87, 147
Deulpota, 60, 61, 62, 139, 141, 142, 144, 145, 147
Deultara, 74, 130
Dhankamala, 69, 75
Dhenkanal, 39
Dhok Pathan Stage, 19
Dhuliapeor, 72, 73
Diamond Harbour, 39, 60, 62, 72. 89, 141
Dinajpur. 52
discoids, 43, 98, 107, 123
disease, 116
Djetis, 27
Dolerite, 55
dorsal, 89
Dryopithecca, 19, 20
Dulong, 84
Dumuria, 70
Durgapur, 54
Dusseldof, 29
Dwarakeswar, 84
dykes, 55

eco-culturel, 118, 120, 123,
ecology, 55, 61, 106, 109, 114, 120
eco-system, 105
Ehringsdorf, 29, 31
Elephas, 60
Elephas Indicus, 62
elongated, 35
environment, 20, 45, 50, 56, 62, 76, 103, 104, 109, 114, 115, 116, 118, 120, 123, 128, 139
Episode, 17, 50, 128
Epochs, 18, 50, 53, 56, 61, 62, 78, 89
Equidea, 56,
Eroded, 55, 60, 61, 67. 68, 99, 116
erxl, 60

fabricated, 21
Falconer, 60
faunal, 18, 61, 62, 115, 116, 118
feeble, 100
felefpeer, 53
Ferrassie, 127
Fərruginous, 51
flake, 33, 34, 38, 42, 43, 61, 70, 72, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 129, 130, 132, 134, 139, 143, 145, 146
flake-blade, 34, 44, 45
flake scars, 35
flanked, 67
flint, 44, 139, 141, 143, 144, 145, 146
flora, 18, 115, 118
fluvial, 87
fluvial food collecting, 33
fooe gathering, 33
food producing, 33
foramen, 23, 25
forehead 25
forest ecology, 20, 100

fossils, 18, 19, 20, 21, 22, 22, 24, 25, 26, 27, 28, 29, 30, 31, 39, 55, 56, 57, 58/fn, 59, 60, 61, 62, 63, 69, 73, 83, 88, 89, 106, 112, 113/fn, 115, 122
fossilised, 28, 75
fossilisation, 60

Gandheswari, 56, 67, 84, 99
Gambbiri, 41
ganga, 141. 142
gangdtius, 59
genera, 19
geographical, 18, 76, 112, 116,
geological 17-19, 22, 27, 31, 37, 39, 47-49, 51, 55, 57, 58/fn, 60, 62, 73, 75-77, 79, 111, 113 115, 116, 120, 141-143
Geomorphic 53
geo-stratigraphy 37, 38, 44, 77, 78, 81-83, 86, 98, 112, 135, 147
Ghattaprabha 40
Ghorapidcha 132
ghutting 54, 55
ghutingdanaga 75, 83
Gibralter 30
Gigantapitoecus 19-22, 26
Gir forest 61
Giridongal 139, 141
Glaciation 29, 30, 31, 50
Godavari 42
Gondwana 51, 54, 55
Gopalpur 71
Gopiballavpur 58
gradient 56
grained 62
gravels 42, 51, 52, 54, 55, 72, 78, 79, 81-87, 89 100, 111, 116, 117, 132, 135, 142, 143, 147
gravel beds 69, 74, 82 113, 130
gravel sheet 75
grazing 116
gringing 33

habitation 22
halikheda 75
hallow scrapper, 43
handaxes 35, 38, 41, 43, 68, 69, 70-105, 107-113, 118-121, 123, 130, 132, 134, 136
handaxe cleaver 96, 111
Hanumati, 67, 74, 100
Hapinin 75, 130
Harappa 63
Haritalyanga 19, 20
Hatempur 141
Heidebengensis 26, 27
Himalayan 52
Holocene 49, 55, 63, 85, 87
Hominids 18-22, 28, 61, 63, 64, 67, 89, 115-118, 120, 121, 123, 124
Homonid fossils 39
Homo erectus 21, 24-29, 51, 122
Homo erectus Capencis 28
Homo erectus leakey 28
Homo habilis, 24-26
Homo heidlber gensis 27
Homo Neandherthalensis, 127
Homo Spaiens 18, 26, 28-30, 128
Homo Sapeines Neanderthalensis 31
Homo Sapens rhodesiensis, 30
Homo Sapiens Sapienes 26, 31, 63, 73, 87, 112, 118, 122
Homo Sapienes Solensis, 30
Hooghly 52
Hosangabad 39
Howrah 52
hydrated 51
Hystrix 57

ideological 17
implementiferrous 67, 142
incidors 25
Indicus 19
Indbera 70, 132
Indus Soan 38
Inhabited 29

interaction 17
inter-pluvial 50
Inter-Glacial 29, 38
in situ 45, 51, 55, 73, 74, 87, 143
iron 32, 51
iso-type 107-109, 123

Jabbi 19
Jahanpore 58
Jalgalia 75
Jam 73, 77, 100
Jasper 43, 44, 51, 88, 139, 141, 144-146
Java 27, 28, 80
Jaw 18-20, 24, 27, 59
Jaypur 130
Jhama Pathar 54
Jhanapana 70
Jhargram 54

Kalegoan 42
Kangra 38
Kangsavati 52, 67, 68, 77, 81, 84, 96, 130
Kankradara 67, 73, 81, 96, 99, 100, 104, 109, 112, 118, 120, 121, 130
Kaolinized 70, 78
Kaomali 41
Karbhaga 68, 70
Karkota 68, 70
Kasai 62, 73, 74
Kendeberia 79
Kestaboue 71
knives 141. 143, 145
Krishana 44, 71
Kuliana 75, 96, 101
Kumari 74, 100
Kurnool 34, 41, 57
Kurumbera Forest 70
Kuthighat 70

La-Ferrassie 30
Lalgarh 68, 71, 112
Lalateswari 140
Lanceolate 99
Landscape 50, 65, 99, 120
Lå-mousterier 30
La-Quina 30
Laterites 51-55, 75, 78, 84-87, 116, 147
Leo 57
levallois 43, 134, 146
limestone hills 25
linnacus 60
lithic 71, 85, 86
loamy 69, 78

magnum 23, 25
Mahadeo Pipuria 39
Mahi 41
Makra pathar 54
Malaprabha 40
Mandible 27, 57, 60, 62
Mantabani 70
Magdalenian 45
Matha Forest 67, 74, 82
Mayurbhanj 39, 71
Mesolithic 18, 33, 49, 141
Mesozoic 55
microliths 61, 68-73, 85
Miocene 19, 39
Mochpol 59, 60, 62
Mohenjodaro 63
Morphology 30, 113
Mount Cireo 30
Mousterian 29, 31, 127, 132
Mukurbanj 75
Mukutmanipur 74
Murishidabad 52

Nandia 52
Nagan 41
Nagri 20
Namadicus 57, 60, 62, 115
Nandur Madneshwar 42
Narmada 39, 41, 63
Narsinghpur 39

Neolithic 18, 34, 49, 61, 71, 73
nodules 54, 142
notches 94

Olduvai 22, 24, 28
Omnibus 118
Omnivorous 23
Oran 27
Oreopithecus 199
Ossiferous 22
Oval 35, 93, 134

Palaeindius 57, 115
Paleaobotanical 114
Palaeoclimatic 61, 116
Palaeoecology 114
Palaeo-environment 37, 75, 115
Palaeoloxodon 57
Palaeomagnetic 111, 112
Palaeontology 18, 21, 25, 55, 60, 62, 114, 115
Palaeoxodon Namadicus 113/fn, 115
Palado-Pithecus, 19
Pallavaram 37, 40
Pandu, 139
Panthera, 57, 115
Paranthropus 23, 24, 26
parganas 141
Patharghata 75
Patanau 78
Paucity 18
Pearform 35
Pebbles 34, 52, 68, 70, 74, 79, 88, 92-96, 134
Pebble beds 82
Pebble block 90
Pebble Core 34, 88
Pebbly surface 89
Periglacial 38
Perigordian 45
Phulbani 70, 132
Physiography 20, 27, 52, 122-124
Pinjor, 58
Pithecanthropus Erectus 25
Plantron 59
Pleistocene 18, 22, 27, 32, 36, 42, 44, 42, 50, 53, 56-63, 72, 78, 84, 89, 93, 115-118, 120-122, 121, 132, 139
Pliocene 19, 58
Pluvial 50, 62, 88
Posolithic 83
Potasium 111
Pottassium Argon 20
Precipitation 50
Premolar 24, 57, 60
Pre-Neanderthal 29
Primates 18, 21, 90
Primeval forest 52
Probosbidea 56
Protruding 25
Purulia 39, 52, 55, 67, 74, 76, 96, 99-102, 123, 142

quantum 50
quaternary 33, 49, 62, 71, 85
quartz 43, 53, 72 88, 99, 135, 146
Ruina 127

Raikan 70
Rajdaha 73
Ramapithecus 19-23, 26, 90
Ramapithecus Panjabikas 20
Ramgarh 62
ramus 59
Qanigunta 45
raw material 32, 34, 43, 72, 88-9, 92, 117, 145, 146
residual 116
river ferrace 32
Rodent, 5, 9, 61
Rodentia, 56
rounded pebbles 89

Sacoopestone 29, 31
Sakha 74
Sand 29, 52 54-5, 62, 72, 83, 142
Sand dunes 70

Sandstons 88
Sapiens 29
Sasra 70
Savannah 61, 116
Scars 91
Scrapers 71, 92, 94-99, 100, 123, 130, 132, 134, 141-145
Scrofa 60
Sedimentary 55, 85
Semi-arid 83, 116, 121
shanidar 30
Sijua 19, 62, 112, 122
silica 51
Silt 52, 56, 73, 81, 84, 100, 116, 130, 139, 142, 147
Simanthropus Pekinensis, 25
Simian 21
Sinhhbhum 39, 44
Singrauli 38
Sivapithecus 19
Siwalik 19, 20, 58
Skull-ridges 24
Skull 23-4 28-9, 42, 59
Snow-sheet 50
Soan 34, 41
Solutrean 45
Sonkatha 143
Spatial-shift 20, 22
Specimen, 15, 19, 20, 27, 30, 56-58, 60-63, 111
speculations 21
Static anvil 90
Statistical 43, 99
Steep-gully 28
Steinhein 31
Steinheion 29
sterkfontein 23
strata 23, 24
strdtigraphy 22, 27, 37, 41, 43, 62, 75, 82, 84, 113, 123
Suidea 56
Sundargarh 39
Suregoan 42
Susunia 55-58, 60, 74, 77, 82, 94, 99, 100, 102-104, 107-109, 118, 122, 130, 143
Suvarnerekha 52, 60, 70, 77, 94, 96, 99, 109, 115, 119, 139, 142-143
Swanscombe 29, 31
Swanbkrans 27

table-land 52
Tabun 30
Tamluk 60, 61
Tdpavana 71
Tavafeni 67, 71 99, 132, 147
Taung Baby 23
taxonomists 30
terraoes 81, 140
Tertiary, 18, 39
Thermoluminesence 111
tool-kit 51, 142
topography 45, 52, 54, 70, 84, 120
tributaries 41, 74, 84, 100
trimming 34
Trionyx 59
Tropical 30, 51
Turkana 24, 28

Uparson 75
Urbhanga 71

Vaccum 22
Vaishabdanga 132
Vanguard 22, 28
vein quartz 55
ventured 34
Verdant 52, 65
Vertebrates 56, 51, 60, 115

Weathered 51, 55, 56, 65, 116

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